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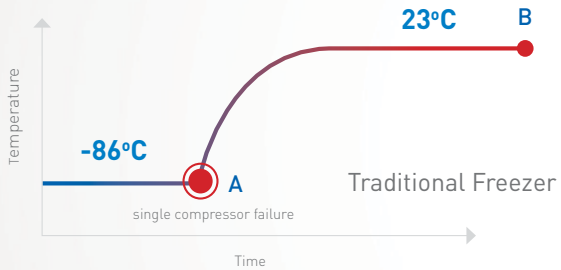

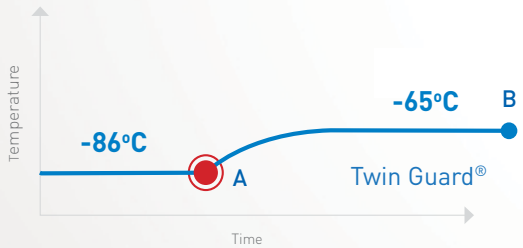

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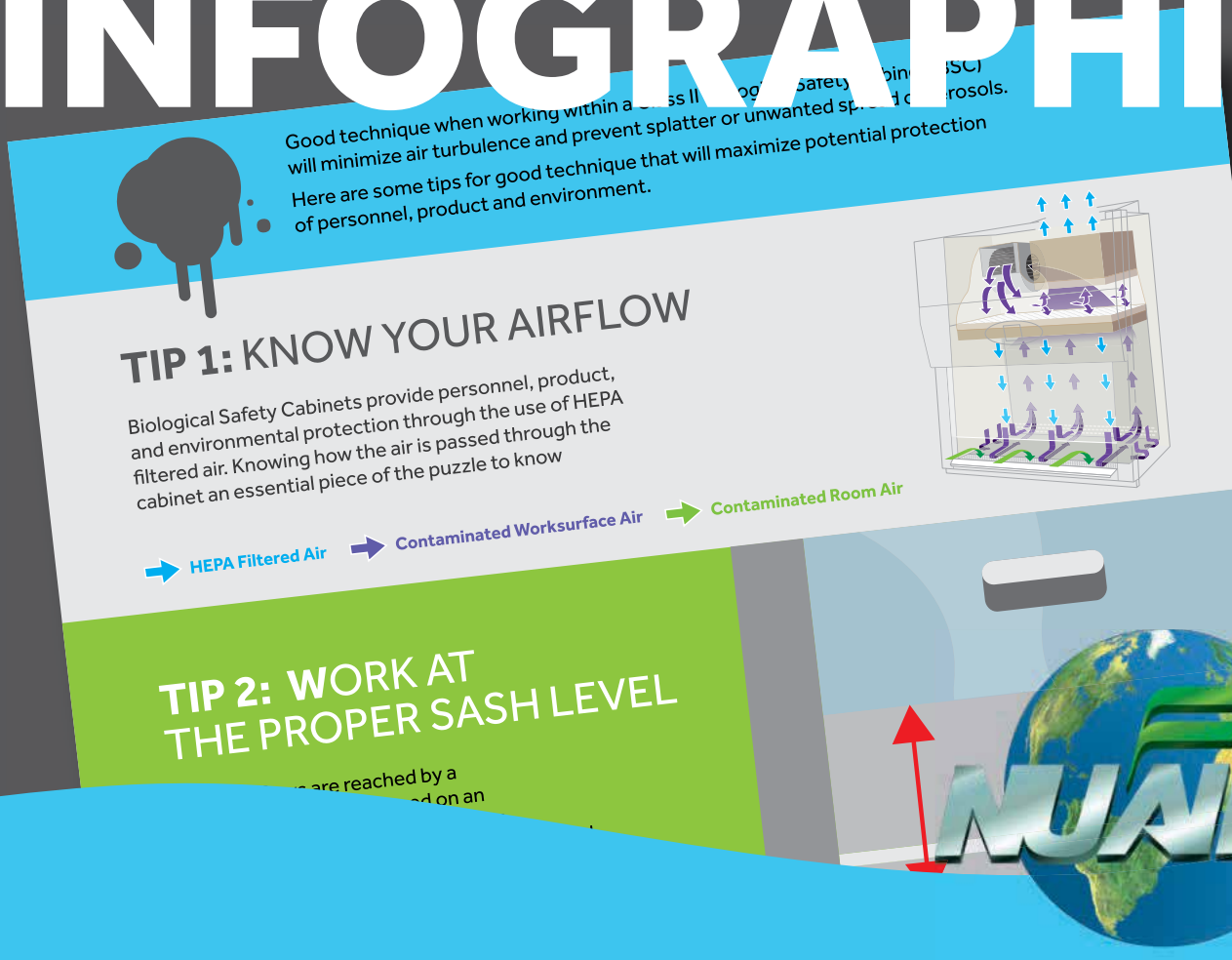

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all things green

Every April for the past five years, *Lab Manager*'s cover story has highlighted developments in green laboratory practices. In that tradition, this month we look at a host of new university-driven sustainability programs that should inspire labs of all stripes. From something as simple and inexpensive as installing timers on equipment that needs to be turned off at night but up-and-running in the morning, to sash monitoring, to sharing lab equipment, commitment to the efficient use of resources does not appear to be waning. "We often look for opportunities that are win-win, both for science and for conservation," says Kathryn Ramirez-Aguilar, PhD, green labs program manager at CU-Boulder. In addition, equipment sharing can demonstrate compliance with federal procurement regulations in the recent Uniform Guidance document, which requires sharing of equipment and avoiding duplicative or unnecessary purchases. For more on the topic of procurement, turn to "The Procurement Process" on page 18.

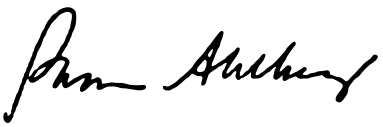
Other articles that align with April's green theme include "Virtual Reality" (page 32), which discusses a 3-D visualization software that allows lab designers to illustrate the elements of a design project in advance, avoiding the waste of having to reinstall equipment and furnishings after the job is completed. New features that offset the energy required for rapid temperature ramping in laboratory baths and chillers (page 68) and advances that lead to more efficient ways to recapture solvent in nitrogen evaporators (page 70) are discussed in respective product focus articles.

Also a fit for the April issue is the topic of millennials, that ideological and community-centric cohort most likely to be leading your lab's sustainability efforts. "In just five short years, millennials will represent 44 percent of the U.S. workforce. Five years after that, that number will be 75 percent!," reminds Mark Lanfear in his "Science Matters" column (page 30). In addition to their communication and teamwork skills, their tolerance of diversity in the workplace, and their easy accommodation of change, it is their comfort with technology that makes them so perfectly suited to today's lab. ("Millennials in the Lab," page 24).

As we learn in this month's Ask the Expert article on trends in lab automation (page 56), that comfort with technology will only serve them better as changes in informatics and communication rely more heavily on portable notepads and software to control instruments inside *and* outside the lab. Next month's cover story on laboratory gadgets and apps will explore this in greater detail.

In the meantime, here's to Spring and all things green.

Best,



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SCIENCE AND sustainability

UNIVERSITY-DRIVEN GREEN LAB INITIATIVES CONTINUE TO POINT THE WAY

BY BERNARD TULSI

With freezers and fume hoods running nonstop, it's no surprise that lab facilities hog more resources than do most other workspaces. Labs consume about four to ten times more energy, water, and other materials than do offices and classrooms. The labs at the University of Colorado Boulder (CU-Boulder) occupied 20 percent of the total square footage on campus during 2010-2012, but accounted for 43 percent of its total energy consumption.

In response, academic institutions have been increasingly nudging their scientists and researchers toward greater resource conservation and promoting sustainability via green labs. The goal of this approach is to save energy, water, and materials and reduce waste, especially toxic and hazardous types. Kathryn Ramirez-Aguilar, PhD, green labs program manager at CU-Boulder, says a green lab is one that "takes action where it can to minimize the use of resources needed for its research."

Dr. Ramirez-Aguilar says energy usage and savings vary across different labs. CU-Boulder's green labs program, which started in 2009, works closely with the university's 400 different labs to help them acquire equipment and appliances like vacuum pumps and refrigerators that are energy efficient but still able to meet their needs. Labs that purchase energy-efficient equipment may be eligible to receive financial incentives, she says.

Turning to the key driving forces behind these efforts, Ramirez-Aguilar says that while "saving money through the efficient use of our resources is certainly a benefit," reducing the footprint of laboratories with respect to energy, water, and other resources is a major commitment. She points out that the 200 variable-air-volume fume hoods on the CU-Boulder campus are targeted for energy savings through ongoing sash monitoring. "We encourage closure of the sashes for more energy savings," she says. Half the freezers on campus had set point changes from -80 degrees Celsius to -70 degrees Celsius, which also target energy savings.

In some cases, savings may result from how the equipment is used—such as turning off vacuum pumps at night—without interfering with research efficiency or safety in the lab, she says. "We often look for opportunities that are win-win, both for science and for conservation."

She believes that a supportive endeavor, like the plug load initiative My Green Lab (www.mygreenlab.org), headed by executive director Allison Paradise, is worthwhile because "it could help the Environmental Protection Agency (EPA) in implementing efficiency-based ENERGY STAR ratings for laboratory equipment."

"Universities, government research campuses, and industry labs need green ratings of lab equipment to help with the selection of energy-efficient items to purchase for their labs," Ramirez-Aguilar says.

"The ENERGY STAR effort for lab-grade refrigerators and freezers (the first lab equipment that would have ENERGY STAR ratings) has been slow and struggling because of a lack of data from manufacturers."

She notes that if the promise of My Green Lab comes to fruition, it could greatly aid the ENERGY STAR rating process by providing third-party tests of the equipment, according to the required test method, to be submitted to the EPA. "This will allow the process to go

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forward without the need for manufacturers to submit their own data," she says.

My Green Lab is a California-based nonprofit group of former engineers and scientists who "care about the environment." The group's online literature states, "We recycle, buy energy- efficient bulbs for our homes, reuse bags in the store, and drive fuel-efficient cars." The group notes that in the lab there is "rarely a thought given to the unrecycled plastic, the energy-demanding freezers, the mercury-laden bulbs we use in our microscopes."

With its stated purpose of bringing "green technology and practices to institutions, companies, and scientific laboratories in order to achieve a safe, healthy, and environmentally and economically sustainable workspace," the group's mission is to "promote green practices and environmentally friendly, sustainable technology in research laboratories."

The sharing of lab equipment is also being encouraged as a way to bolster sustainability objectives. The sharing of ultralow-temperature freezers is a notable example at CU-Boulder. "A great effort for the promotion of equipment sharing is an instrumentation website at the University of California, Santa Barbara (UCSB). These sites offer a real benefit on campuses across the nation because they enable researchers to know what resources may be accessible on their [own] campus," says Ramirez-Aguilar.

This is especially important at this time of tremendous competition for grant funding, and can help ensure efficient use of grant money, she says. "There is a need for these sites on campuses across the nation (on university campuses and likely government ones as well) so scientists can know what resources already exist and don't spend precious funding for items that they already have access to."

She says that these sites also aid in efficient use of tax dollars and promote cooperation between scientists on a campus and across sectors (university, government, and industry). "For university campuses, a shared equipment site could also show that a campus is working to be compliant with federal procurement regulations in the recent Uniform Guidance document (procurement regulations will go into effect December 26, 2015) that requires sharing of equipment and avoiding duplicative or unnecessary purchases."

These sites also enable universities to showcase their equipment assets, which could lead to attracting research talent and industry collaboration and funding, according to Ramirez-Aguilar.

Dr. Amorette Getty, staff advisor at UCSB's LabRATS program, has been focusing on the development of effective instrumentation databases—www.mrfn.org and www.sharedinstrumentation.ucsb.edu. The Materials

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Research Facilities Network is a countrywide partnership of the Shared Experimental Facilities, which is supported by the National Science Foundation. The UCSB site displays instrument type by facility, among other information, and currently covers 55 facilities with a total of 319 instruments.

According to Dr. Getty, these sites increase access to specialty equipment. She notes that the green contribution of these efforts stems from the reduction of "redundancy in equipment needed, less embodied energy in the additional instrumentation, more efficient and full use of existing investments and expertise, and the interdisciplinary networking created." She perceives these as "an advantage to the local, national, and international research engines as a whole."

"I think this is a big use of the modern digital landscape to enhance research, alongside high-performance computing/modeling and improved data sharing, to streamline experiments and minimize redundancy. Those things indirectly but significantly impact water and energy use and our more traditional green focuses."

Elaborating on some of the key issues of the traditional green labs focus, Allen Doyle, sustainability manager at the University of California, Davis, says the green labs concept "applies the core principles of sustainability to the scientist's workplace performance and cost as well as environmental protection and quality of life."

"High performance is essential; the science has to be done correctly and precisely at the right level, but it has to be done safely with less energy, plastic, wire, and other materials and resources."

Acknowledging the challenges associated with measuring sustainability outcomes, Doyle says it is difficult to gauge energy and electricity use, especially in older laboratory buildings. "To measure the total electricity used by a lab, it is necessary to have a circuit isolated for that lab, which is rare. Then to measure it, an electrician will have to snap a sensor around the power supply to that lab—which is expensive and not easy to do.

"So we have to prioritize either water use or electricity or amounts of plastic waste and figure out other ways to get the metrics on sustainability," he says. He notes that obtaining precise metrics for sustainability rates could well be impossible to do.

Part of the challenge, he says, is that these kinds of measurements are coming into focus only now. "We have supported scientists and their creative processes to have the most productivity without having to worry about energy goals—when electricity was very cheap."

He says that universities supported scientists "to come in and do their creative magic" without worrying about costs and resource utilization. "Now we are dealing with the consequences of that, as we are realizing that because of the impact of greenhouse gases and water shortages we have to engage laboratory staff in resource reduction."

Doyle says that scientists have traditionally not concerned themselves with how lab facilities work—in one exercise, among 20 scientists only one knew how the light switches in a lab worked. "One of the ideas of green labs is to engage scientists to participate in conservation in the workplace—that engagement is a big part of what the green labs initiative is all about."

Turning to factors that could help drive such engagement, Doyle says, "At the institutional level, there are tremendous opportunities for cost savings. We just renovated a large lab building, and just from energy savings we got $1 million in rebates from a local utility company." That will help bring the payback for the renovation into the four-to-five-year range, he adds.

Doyle says that at the researcher level, participation in green initiatives is pretty much voluntary. He notes that a number of scientists believe "it is the right thing to do, they understand their environmental impact, and they see a lot of plastic waste and are aware of how much energy and water they consume. Some of them are very excited to see it coming and welcome us to brainstorm with them.

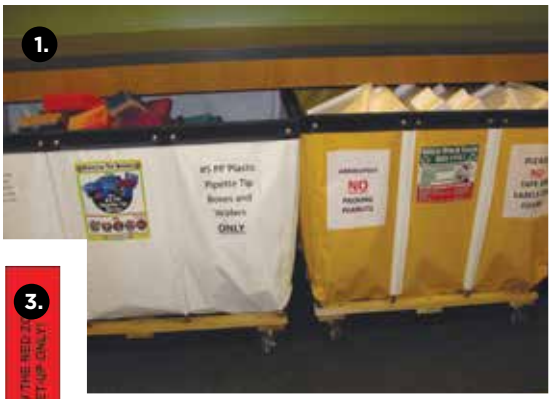
"Other scientists are [too] busy to join in because of their heavy research schedules. They are also pressured by the current challenges associated with getting research funding."

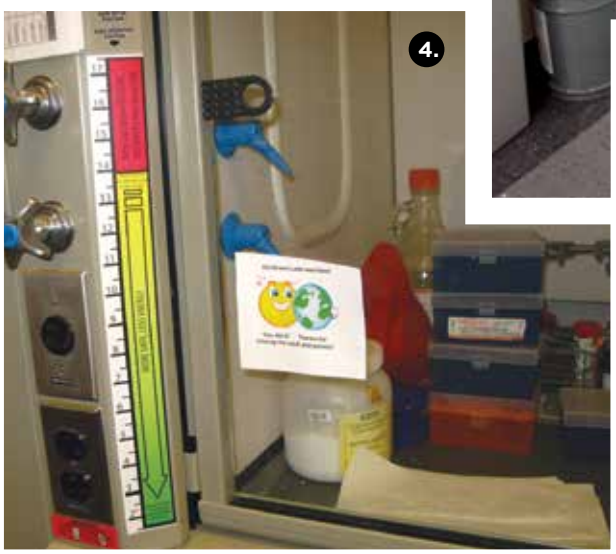
Doyle says that there are no regulations for being a green lab. "We have chemical safety codes and ventilation codes that are required. Because people want to be extra safe, we treat labs as all potentially hazardous and ventilate them the same way, which actually makes labs very expensive."

He says that one of the frontiers for labs is to understand that they are essentially nascent offices and to treat them as such—"and to reward the occupants for keeping a safe workspace." That will be a future driver, he says, adding that some labs are very low risk and managers can take advantage of that by using specialized sensors to monitor and confirm whether the air is fresh and safe to breathe. Based on that, ventilation rates can be slowed down quite a bit, he says.

"The sharing of lab equipment is also being encouraged as a way to bolster sustainability objectives."

In addition to slowing down ventilation rates, it is also possible to have the lab building "go to sleep" at night, Doyle says. "Until recently we have assumed that every lab might have a scientist in it at 3:00 a.m., so we ran systems 24/7—and as a result, a lot of buildings are overdesigned and out of control. This makes operating lab buildings tremendously expensive. We have several buildings here that have million-dollar air-conditioning budgets."





1. Pipette tip box and foam recycling. **2.** Metal solvent containers waiting to be recycled. **3.** A 50 cent solution to a thousand dollar problem to keep fume hood "sashes" closed. This traffic light color scheme has been installed on about 10,000 fume hoods around the country. **4.** VAV fume hood sash signage. **5.** Research freezers crowding and heating a hallway. Each uses the electricity of a standard house.

Doyle is the first sustainability manager UC Davis has had in that position for about six years. He says that when he started in the field about nine years ago, he did not know of any other green lab programs in the country. "Now there are more than I can count. There are about 200 people like me around the country who are promoting green lab practices on their campuses, and even in some private, nonprofit and federal government labs. "It has really blossomed a lot in the [past] six to eight years."

He says that federal labs have workshops on energy-efficient laboratory equipment and vendors are making greater efforts to develop and sell energy-efficient equipment. There are more equipment choices—vacuum pumps, water coolers, lasers and new ultralow- temperature freezers that use about half the energy of older models—for green lab solutions. He adds that ventilation standards are improving and that lab leaders are looking increasingly into automated control of their facilities.

6. Two students testing old freezers for energy savings documentation—one freezer is 15 years old, the chest freezer is about 30 to 40 years old **7.** In 4 to 6 months it pays off to give away outlet timers for laboratory equipment that is not practical to turn off late at night, or on very early in the morning. **8.** A student installing outlet timers for equipment that needs to be stable first thing in the morning.

Doyle says that there are about 1,000 freezers in the labs at UC Davis, each of which uses more electricity than does a house. He describes the operation of freezers at temperatures such as -80 degrees Celsius as overkill because there is rarely a need to operate in such cold conditions. "This is a push by industry, not science," he says.

In the future, he would like to see better dry storage of samples. "I am hoping that cold storage will be managed at [the] institutional level." He says that is difficult because individual scientists now take responsibility for cold storage and for the management of inventory and other details—a rather ambitious undertaking. Doyle is optimistic that the ventilation of lab buildings will "get a lot smarter in the future and that there will be elegant breakthroughs in building automation," all of which will advance sustainability objectives.

Bernard Tulsi *is a freelance writer based in Newark, Delaware. He may be contacted by email at btulsi@comcast.net or by phone at 302-266-6420.*

THE PROCUREMENT PROCESS

RFPS, MAINTENANCE CONTRACTS, SUPPLIER AUDITING, AND MORE

by Lina Genovesi

Pharmaceutical companies, healthcare providers, research organizations, universities, and government agencies are continuously under pressure to cut costs due to a generalized economic downturn. This pressure has moved the procurement process to the forefront, with managers looking to achieve better business performance through more effective management of categories, suppliers, and teams.[1]

Lab managers who are facing the mandate to cut costs while procuring high-quality and low-risk equipment and equipment maintenance services must use the procurement process to set the parameters of quality and risk.

Setting quality and risk

This important process starts with compiling a request for proposal (RFP). The RFP is an invitation to selected suppliers to bid on a specific piece of equipment or equipment maintenance services. The information gathered in the responses to an RFP is useful in rating equipment and maintenance suppliers to set the criteria for quality and risk.

Josephine C. Longoria, regional lab director, Guadalupe-Blanco River Authority, believes that an RFP has benefits. "An RFP enables lab personnel and management to come up with a checklist of what is important in terms of equipment and maintenance specifications and ensures that all parties involved are on board, and also allows all qualified vendors to have an opportunity to bid on the specific product based on the RFP created," says Longoria.

Compiling an RFP occurs in the context of the policies and procedures of the lab and the quality plan. In Longoria's lab, procurement is subject to the Texas Water Code, and for capital expenditures that exceed a certain amount, an RFP is a required step in the procurement process. "We are required to solicit at least three written bids, which are based on uniform written specifications, for items costing between $25,000 and $50,000," says Longoria. "We must obtain competitive bids for any item over $50,000, and the Texas code also requires that we advertise a purchase or awarding of a contract."

A well-developed RFP requires a certain level of due diligence.

A first level of due diligence goes to the equipment itself, including its price, the equipment service contract, the duration of the manufacturer's warranty, the availability of parts and consumables, and the technical support and system updates. A second level of due diligence goes to the services that are required to maintain the equipment; labs have several options for equipment maintenance. A third level of due diligence goes to gathering information on the potential suppliers, including their financial viability.

Selecting suppliers

Following the bids and the responses to the RFP, suppliers of the equipment and maintenance services are selected, based on the information gathered in the RFP.

Daniel J. Scungio, laboratory safety officer at Sentara Healthcare, believes equipment maintenance is important to maximize quality and minimize risk. "Equipment maintenance is an essential component of quality in not only ensuring good working equipment, but also in ensuring that the instrument is consistently compliant with regulations, which minimizes the risk."

Labs have several options for equipment maintenance. These options include working with in-house teams, third-party service providers, original equipment manufacturers (OEMs), and multiservice providers.

In-house teams are generally composed of maintenance and service teams. In some instances, members of maintenance teams are also trained to service a piece of

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equipment. "With certain equipment, we send one of the team members to school so that he or she gets trained to service the equipment," says Scungio. "However, if a 24/7 maintenance schedule is required, we would not rely on our in-house team to maintain quality and lower performance risk and would outsource equipment maintenance to a third-party service provider or an OEM."

Third-party service providers are based in a specific location or region, while OEMs are based at their factory site and offer maintenance services through their local representatives.

Certain OEMs operate as multivendor service providers and offer an integrated approach to lab equipment maintenance, asset tracking, regulatory compliance, inventory management, and equipment relocation and disposal.

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Agilent Technologies offers the CrossLab Services[4] multi-vendor service platforms in several plans: the Gold Service plan for high throughput and mission-critical systems; the Silver Service plan for lab operations; the Bronze Service plan for equipment protection; and the Preventive Maintenance plan for prolonged equipment life.

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FDA 21 CFR Parts 11, 21, 58, 210, 211, 820
cGLP/cGMP (Good Laboratory Practice and Good Manufacturing Practice)
Section 508 Accessibility Guidelines
HIPAA Accountability Act of 1996
HIPAA Patient Safety and Quality Improvement Act of 2005 (Patient Safety Act)

Compatibility:

- PC/MAC
- Tablet
- Smartphone
- Web-based
- Cloud

Pros and cons

There are pros and cons associated with each option for equipment maintenance.

"Whether a lab relies on its in-house team, a third-party provider, an OEM, or a multiservice provider, quality is measured by the increase or decrease in the level of risk, which is inherent in maintaining the equipment to meet the demands of the lab," says Scungio.

Maintaining in-house teams requires a huge investment on staffing, training, infrastructure, and inventory management, and is likely to make operations dependent on the allocated resources for maintenance. In a continuously changing technological environment, the efficiency and technical expertise of the team is always a concern and any resource loss would add to the risk. These are the reasons that lab managers and their procurement departments are moving toward outsourcing to an OEM, a third-party service provider, or a multiservice provider either as a first option or as a stopgap measure in the event of any failure of the in-house team.

Third-party service providers do not have the large overheads of OEMs, are able to provide services at a cost savings, and can be useful in times of a sudden equipment breakdown as their response time is quick, even though their inability to maintain quality due to technological change and associated risks may be trade-off points.

For small labs with a limited number and limited types of equipment, OEM service teams are a favorable option. Whether the lab is small or large, an OEM guarantees a qualitative low risk due to potentially uninterrupted laboratory functioning. An OEM also increases the total cost of ownership of a piece of equipment due to comparatively costly spare parts and labor and high administration costs.

In terms of the quality and precision of the service, a multi-vendor service provider is comparable to an OEM. A multi-vendor service provider can handle equipment supplied by other vendors and supports on-site services. Opting to use a multiservice provider decreases the total cost of equipment ownership by streamlining the service processes, increasing operational efficiency, and reducing the expenses while minimizing the risk involved. For large labs, a multi-vendor service provider offers an optimum solution for asset management, and for very critical equipment, a multiservice provider can ensure that equipment uptime is maintained.

Postprocurement

Postprocurement, lab managers must monitor supplier performance for continual improvement and to ensure adherence to the quality and risk criteria.

"The use of a continual improvement philosophy is fast becoming a requirement to keep costs down and ensure that quality is at a maximum and risk is at a minimum," says Scungio. "Continual improvement is even more important when equipment and maintenance services are used in the context of patient services where health and safety issues are important considerations."

Below are tips for monitoring supplier performance.

Auditing

- Conduct a meeting with the supplier at the beginning of the equipment maintenance program.

- Conduct audits to review established supplier delivery metrics such as the on-time and quality delivery of services.
- Conduct audits to test the compliance of a supplier's quality management systems.
- Conduct audits to review the actions taken by the supplier under the improvement plan.
- Conduct audits of supplier process recertification for suppliers providing regulatory compliance.
- Conduct audits to perform a risk reassessment to identify any new risks.

Remediation

- In the event of deviation from established delivery metrics, devise an improvement plan for the supplier to follow
- Request that a supplier take corrective actions to develop and implement mitigation plans for the risks identified during risk assessment
- Monitor the status of any risk mitigation plan during future audits

Supplier auditing must be done on a regular basis, and in the event of risk identification, the frequency of supplier auditing and monitoring must be based on the results of any risk assessment.

Going forward

Companies are using procurement and sourcing functions to differentiate themselves from competitors and optimize key business processes.[7] With the pressure to cut costs on the rise, it is incumbent on company management to empower and support lab managers to make the best possible procurement decisions, thereby maximizing their quality and minimizing the risks inherent in purchasing equipment and equipment maintenance services.

References:

1. http://www.atkearney.com/procurement/assessment-of-excellence-in-procurement-study/full-report
2. www.perkinelmer.com/onesource/
3. www.thermofisher.com/en/about-us/unity-lab-services.html
4. http://crosslab.chem.agilent.com/services.html
5. http://www.gelifesciences.com/webapp/wcs/stores/servlet/catalog/en/GELifeSciences-si/service-and-support/lab-optimization-solutions/
6. http://www.gelifesciences.com/webapp/wcs/stores/servlet/catalog/en/GELifeSciences/service-and-support/multivendor-life-cycle-asset-management/
7. http://www.atkearneypas.com/solutions/spend-analysis.html

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MILLENNIALS IN THE LAB

A FIT FOR THE FUTURE

By Rachel Muenz

Ducks and water. Birds and sky. Squirrels and trees. Some things just fit their environments perfectly. Similarly, with their technological savvy, millennials could be considered the perfect fit for the laboratory, according to the lab managers we spoke with.

"In the lab, I see a great opportunity for millennials," says Josephine Longoria, director of the Guadalupe-Blanco River Authority's (GBRA) Regional Laboratory (Seguin, TX). "The reason I say that is because we're moving into a 21st-century mentality with respect to technology and I think millennials thrive on that. In my line of work, we're currently updating our LIMS and the ideas [millennials] come up with are just incredible."

Employment of millennials, defined as those born between 1980 and the early 2000s, has been a major trend in the workforce as they replace retiring baby boomers, and much has been written about the myths surrounding them, such as their sense of entitlement, lack of loyalty, and desire that their jobs be more than just a source of income. Most of the hundreds of articles on the Web that focus on millennials suggest these stereotypes are just that, stereotypes, and it all comes down to properly managing this generation to get the most out of them.

Clinical lab supervisor Brandy Blackburn agrees, pointing out that, while there are some commonalities in most millennials, staff members are still individuals and have their own strengths and weaknesses that don't always line up with the main pros and cons of their age group. However, in managing millennials in her lab, she's seen a few similarities across this age range.

"They are very flexible and can switch tasks easily," Blackburn says, describing one of the pros she has seen in her millennial-aged staff. "They are more willing to change their hours to accommodate business needs than are workers from other generations." However, she adds that their desire for flexibility can be an issue. "They want a lot of flexibility from their employers with regard to scheduling, which is an issue in a clinical lab where turnaround time is critical."

Blackburn agrees with Longoria that millennials' comfort with technology and automation is an asset in the lab, along with their communication and teamwork skills, their easy accommodation of change, and their tolerance of diversity in the workplace. Another positive, which can also be a negative, however, is millennials' directness.

"If they do not understand something, they will ask," Blackburn says. "[But] they will question a superior in the same way they will question a peer."

Managing millennials

Longoria and Blackburn say there are some things they do differently with millennials, but as far as managing this particular group is concerned, overall their management style is pretty similar for all groups in their labs. Longoria's organization took proactive steps to prepare for the expected retirement of baby boomers in her lab, putting management through generational training because they knew many of the vacancies would be filled by millennials.

"Understanding what's important to them is critical for continued success," she says, adding that her lab has recently had a second batch of employees retire, meaning even more millennials are expected to come on board. "I've been doing what I'm doing for 21 years, so I would be considered a Gen Xer, but I'm kind of in the middle, where I understand baby boomers but I also understand the millennial thought process. I think I have a great advantage because I have a lot of nieces and nephews who are the same age as some of these millennials."

She adds that taking the time to listen to millennials is important, along with providing feedback and recognition, to get the best work out of them. For example, her

lab has a token program where employees who do a particularly great job receive a token to reward that effort.

"I think the program has been very helpful for that generation, whereas it may offend someone of the baby boomer era or the greatest generation era," Longoria explains. "That might be offensive to them because older workers see [going above and beyond] as part of their job. I'm very careful, conscientious and aware."

In her experience with millennials, Blackburn, a Gen Xer like Longoria, has also noticed that they tend to require more positive reinforcement than do workers of other generations.

"There are some differences in the way I approach directing millennials versus other generations," she says. "Millennials need more encouragement but less direction. They don't seem as worried about job security as other generations, likely because many of them continue to be supported by their parents until their late 20s."

Connecting with staff on an individual level is something Longoria believes is important when managing all employees, not just millennials.

"Most managers are part-time psychologists," she explains. "I hate to say that but it's true. You have to connect with people. That doesn't mean you're going to be best friends with everybody and go and hang out every night, but connecting with them on an authentic level is extremely important. I truly think everyone has something in common."

In her case, Longoria's love of music is something that helps her connect with staff members of all ages, because her taste is so varied.

"I connect with pretty much all my staff because of music," she says, adding that the team concept her lab uses is a good way to integrate all kinds of diversity in the workplace. "In a team, you include all the team members, no matter what generation they are in and no matter what's important to them. You have to respect the differences. Accepting diverse needs, wants and expectations is pretty challenging, but if you understand that at the beginning it's not so painful in the end. I think just having a positive attitude and putting positive energy toward any subject matter or goal is critical."

Addressing the cons

As far as some of the cons of managing millennials go, Blackburn has found that they can tend to share too many personal details, and although they are skilled at using technology, "they tend to have very little interest in the programming or mechanical aspects behind it." She adds that they don't seem to have the same kind of loyalty to their employers as do workers of previous generations. However, she doesn't see these flaws as a total disaster for the lab.

"I don't think that there is a problem with the millennials; I think the problem is how to integrate millennials with other generations," she says. "I am sure it is an issue faced every ten or so years when a new generation is introduced into the workforce. There is no right or wrong; there is just different."

One of the key stereotypes about millennials is that they are lazy and entitled, but while they can see where that view comes from, neither Blackburn nor Longoria completely agrees with it. Blackburn says she believes that impression of entitlement comes from millennials having grown up in a healthy economy, being raised by so-called helicopter parents and being used to "getting what they want and getting it quickly."

"They are not used to limits or to being told 'no,'" Blackburn adds. "They cannot understand why everyone cannot be promoted or why they can't make up their own schedules."

As for millennials being branded as lazy, Blackburn says that comes from a misunderstanding as well, since in her experience millennials "just seek easier ways of getting things done."

Longoria admits that she did have an issue with that perception of entitlement when she first started working with millennials, until she gained more understanding through generational training.

"I was not used to people expecting something when they haven't proven themselves," she says. "I'm from a generation where you prove yourself and then you expect a reward. When somebody today graduates with a degree, that degree says a lot more to them than it does to somebody who has experience and a degree. It's very difficult for me to advance workers when they haven't proven themselves. I'm still very big on performance. Degrees are great—a master's degree is even better—but that doesn't necessarily mean that they're going to be the greatest employees."

Fit for the future lab

With continuing advancements in lab technology, including mobile access where lab technicians can check up on lab instruments from home, and an increased focus on efficiency and lean processes, millennials seem perfectly positioned for the lab of the future.

"They embrace technology and want to use it whenever they can, and they like to be creative and discover how to simplify a task using technology," Blackburn explains. "They don't have all the answers, but they sure know where to find them."

Longoria adds that millennials have had a hand in altering the landscape at her lab, but the manager's role is still important in making the most of their ideas.

"Lab managers have a lot more influence than they think. The face of the lab has changed in the 13 years I've been here at GBRA and I think millennials have a lot to do with that," she says. "There are just a lot of different thought processes. Millennials love technology, which the laboratory is in dire need of. We're potentially moving from tower computers to tablets. We're doing remote access to our equipment from home, so that way, if you want a day off on Friday but you can check it from home, you can do that now. People like me, we're more hands on. It's kind of like the Kindle versus a paper book. It's a good transition that the world of laboratories is going into. It's a really good fit for me, personally."

She adds that lab managers shouldn't view any flaws in the millennial generation as obstacles or challenges if they want to maximize the potential of those employees.

"Think of it as a skill set and a way to maneuver, instead of something you've got to get over," she advises other lab managers. "For anybody who is in my position, that's the first step of really being successful with the new generation. Just let them know that you appreciate them the way they are—you're not going to try to change them, but, on the other hand, they also have to understand that they're going to have to compromise with respect to expectation and production."

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YOU LOST ME BEFORE "HELLO"

By Bob Pacanovsky

Three ways to avoid embarrassing yourself with colleagues and improving your "lab behavior."

It's true what they say—you never get a second chance to create a great first impression. Psychologists believe we only have between 15 to 30 seconds (or sometimes even less time) to make an impression on others.

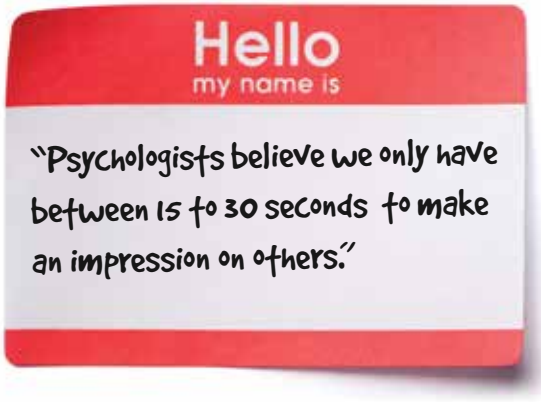
Here are lost opportunities I have witnessed over my career of companies and organizations that have created the *wrong* first impression. You need to stay away from these or you could lose a client or prospect even before you say "hello."

Relying too much on technology

It's a wonderful tool, but sometimes the smartphone is the crutch that could make or break you. By keeping it on the table during dinner (or during a meeting) and answering it, you have created a perception that whatever is happening on your phone is more important than your current person-to-person conversation. It may be, but do NOT let your guests perceive that!

Acting like you're still in college (even if you still are!)

Those were wonderful days, but we need to keep those days and those immature behaviors in the past. An open bar at a corporate event is not an invitation to "triple-fist" your beverages. Just because you *can* order as much as you like doesn't mean that you *should*. It doesn't make you or your company look good in the eyes of a client or prospect. Remember—"perception is 9/10th of the law."



Location, Location, Location—creating the wrong impression even before you start the meeting

What does the location of your meeting have to do with professional etiquette and the brand that you are creating for your company and yourself? It could be a lot, yet no one will ever mention anything to you about it.

Yes, the meeting room should be clean, but how about the lobby, parking lots, and restroom? What type of impression are you creating for your lab, your team, and yourself if they are not looking great?

Actions speak louder than words

Your actions and behaviors are just as important (if not more) as you work with your associates "in house," as they are with your clients. Make sure to treat those people that you work with every day with the respect they deserve, especially in the office. If your body language and gestures toward them are mean, demeaning, and rude, people will pick up on that. Labs won't tolerate someone whose actions make it look bad.

Bob Pacanovsky *is president of The Vātion Group in Akron Ohio and speaks about making shifts in your corporate culture and behaviors. You can learn more at www.TheVationGroup.com or call (330) 352-6084.*

LABCAST

Be sure to attend Bob Pacanovsky's Lab Manager Academy webinar, "Watch Your Behavior…They Are!" on May 6, or afterward at www.labmanager.com/behavior to watch the archived video.

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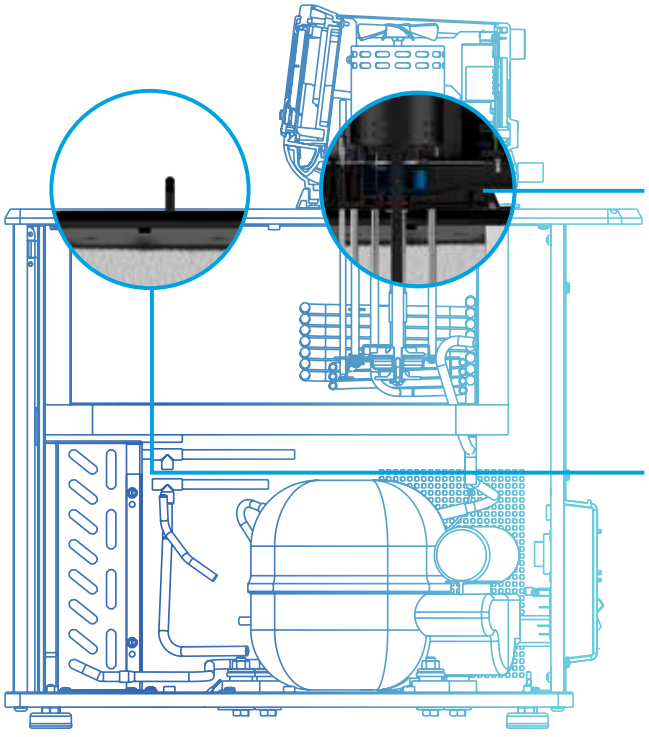

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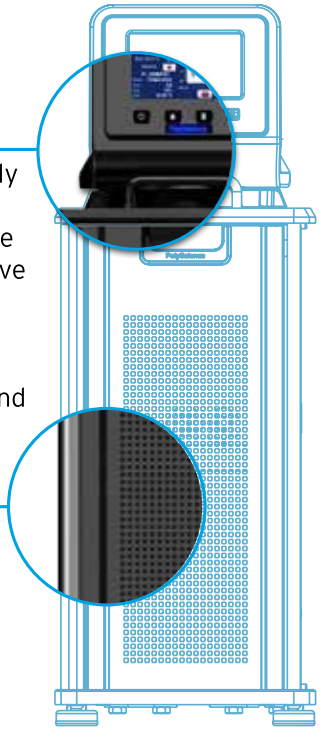

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LATEST TRENDS SHAPING THE SCIENTIFIC WORKFORCE

MANAGING MILLENNIALS—IT'S THEIR GENERATION NOW

By Mark A. Lanfear

When the workforce consisted mainly of baby boomers, organizations were able to get away with a broad, blanket approach to workforce management. However, with Gen Y, also known as millennials, now constituting a rapidly increasing percentage of the current workforce, a blanket approach has become obsolete, maybe even a liability.

Businesses that want to successfully tackle future workforce challenges must recognize that up-to-date management and engagement techniques are necessary to effectively attract and retain millennial talent. Savvy HR execs and operational leaders who make the effort to utilize these workforce management approaches now are likely to provide their companies with huge human capital dividends in both the near and long terms.

In just five short years, millennials will represent 44 percent of the U.S. workforce. Five years after that, that number will be 75 percent! While more baby boomers and Gen Xers are expected to work beyond the age of 65 than in the past, these changing demographic trends are remarkable to consider.

In many ways, the evolution of generational cohorts resembles the evolution of the life sciences industry. During the pharmaceutical golden age of the late 1990s, approximately 135 drugs were approved in two years, and the industry reported growth of between 7 percent and 8 percent each year. There was an explosion of R&D and marketing activities for life-changing medicines, a phenomenon never before seen. The next new big thing was "biotechs" and biological medicines. This was followed by the age of the "generic" compound, where great energy was poured into reproducing what pharma had previously done. Now we're watching the dawn of "biologics" or "biosimilars," clones of the original biologics that were created through highly complex and sensitive manufacturing processes. These "living" medicines include discoveries like the blockbusters Humira and Enbrel.

This industry progression built upon itself, with each generation finding new ways to explore, improve and innovate based on what came before. The evolution of human capital in the workplace from the baby boom to the dawn of the millennials shows many of the same patterns.

Millennials, born between the early 1980s and the early 2000s, took to technology— computers, video, and cell phones invented by previous generations—and have made them their own indispensible tools for social interaction, education, and daily life. They use social media to stay connected with friends, they believe in the power of networks, and they invented a language that might have stumped a code breaker like Alan Turing (LOL).

A few years back a book was published, *GEN Now: Understanding the Multi-Gen Workforce and the Coming Leadership Deficit*. It provides an insightful perspective on understanding millennials; it also suggests strategies for engaging them. The book also compares and contrasts how the different generations view their work-life balance and how organizations must adapt their recruiting and retention strategies to deal with this inevitable demographic shift.

While Gen Now is arguably the best-educated generation in history, after living through the turmoil of the 2008 U.S. recession many are not expecting to have traditional "careers," but rather they are planning to have "series of professional experiences." This is a significant departure from the ideal career pursuits of previous generations. Millennials also tend to be team-driven and inclusive, and they have a significant appetite for change. They like constant feedback, which they enjoy personally and professionally while engaging their social media networks. And although baby boomers "live to work," Gen Now "works to live." They are inspired by the value they add to their work and seek meaningful assignments over the myriad other attraction techniques offered by employers. Many are frustrated by traditional office hierarchies, "cube life," and the vague notion of a 9-to-5 job. Their sense of loyalty to an employer is far different from what baby boomer and Gen Xer managers might project onto them. Loyalty for Gen Now is to their professions and networks, rather than to their employers. It's quite a big shift.

IMO, successfully managing your Gen Now workforce means keeping some key things in mind and not being afraid to walk away from tradition if that's what's warranted. Given their desire for regular feedback, you should implement more frequent, more casual performance reviews, rather than the typical once- or twice-a-year sit-downs with the boss. Know that they expect honesty and genuine dialogue and dislike barriers if they're trying to solve problems. For example, if you say you have an open-door policy, follow through. Promote and celebrate their connectivity skills as a way to build trust within your organization (it may well increase productivity, too). Set up mentoring programs that encourage interaction between employees of different generations. And find ways to provide meaningful career-building opportunities, even if they don't mean a promotion right away. Think "career rock wall" rather than "career ladder."

One thing's for sure: You'd never treat a complex biosimilar product the same way you'd treat a generic drug. And you'll absolutely want to manage Gen Now talent in ways that take into account their different views and standards that maximize their strengths and potential.

This is a topic that we'll be discussing for years to come, without a doubt. And I've only touched on some of the ways you'll need to think differently about successfully managing millennials. One of the biggest questions remaining to be answered is whether this Gen Now cohort will reach its potential and change the world. I'd love to get your thoughts on this. TTYL.

Mark Lanfear *is a global practice leader for the life science vertical at Kelly Services, a leader in providing workforce solutions. He has operated clinical trials around the world for almost two decades. In addition, Mark is a featured speaker at many life science industry conferences and a writer for life science periodicals. He can be reached at Mark.lanfear@kellyservices.com or 248-244-4361.*

VIRTUAL REALITY

VISUALIZATION SOFTWARE ALLOWS RESEARCHERS TO "SEE" THEIR LABS BEFORE THEY'RE BUILT

By Chuck Yocum

Communicating the final design of a laboratory to the principal investigators and their research teams can be challenging. Although our clients are world-class researchers, they do not travel in our world of scaled plans, Computer Aided Design (CAD) and Building Information Modeling (BIM), or specifications. Even though extensive measures are taken by all parties to reduce any misinterpretation of design intent, no system is perfect. The research team may struggle to completely interpret and understand the design documents' intent. However, all becomes clear once walls are studded, utilities are roughed in, and room layouts begin to take shape. However, there is a better method for design communication.

By inputting the BIM project data into sophisticated 3-D virtual reality (3DVR) visualization software, lab designers can illustrate, in very photo-realistic detail, the design elements of the project to their clients. These sophisticated programs enable viewers to "see" and actually "walk through" the laboratory of the intended final design using an HD headset and motion trackers. It is an immersive 3-D design experience that supersedes anything that can be experienced on a tablet or computer screen. Since it is full scale and immersive, the principal investigators and their research teams actually *exist* as if they were in their labs. They can walk around, reach out to sense heights/configurations of shelving and benchtops, or check the adjacent locations of equipment, sinks, emergency showers, and more. These visualization tools can clearly illustrate design elements such as finishes, colors, lighting placement, floor types, etc. Best of all, the design team can utilize the photo-realistic detail of the spaces to communicate to the researchers the final product *before* construction begins. This allows the design team, owner, end users, and facilities/EH&S department to capture any changes *prior* to construction to limit change orders. Imagine the communicative power of holographic laboratory design to allow the principal investigators and their staff to completely visualize their completed laboratories all prior to construction.

▲ *Screen shot of VR lab model with insert of viewer with headset.*

These 3DVR systems have been successfully used by companies such as Turner, DPR, Martin Brothers, HKS, Perkins+Will, and The Center for Health Design. End users were able to "see" the conceptual or final layouts at full scale. They were able to discuss alternative designs instantly while feeling immersed in the lab. Using a hand device or wand, the viewer end users can initiate discussion on design changes/alternates for finishes, lighting, and even equipment placement. This collaborative design occurs at the construction document (CD) stage of design and long before the foundation is set or walls are studded.

Use of 3DVR design has accumulated quite an impressive resume of projects in which this type of design tool has been utilized, projects such as Miami Children's Hospital; MD Anderson Cancer Center, Houston; St. Luke's Brain and Stroke Institute, Kansas City; and Northwestern University, Evanston, Illinois.

VR's return on investment and change orders

If one were to consider a 25,000-square-foot lab renovation project budget costing approximately $4 million ($160 per-square-foot hard costs), a project manager would probably set aside 5 percent for end-user or owner change contingencies. This represents a value of approximately $200,000. These are the most expensive change orders, as they usually occur after utilities are roughed in or just before the move-in date. It is at this time that the PI team actually understands the conversion of 2-D plans to 3-D reality. By utilizing an immersive, 3DVR system, the design team can actually mimic the research team's walk-through of the space as if it was a week away from the move-in date, thus confirming final equipment placement, utilities locations, bench heights, finishes, and any other aspect of the design. Since any change requests or edits occur in construction documents and not at the end of the project, any changes made are captured on paper and not in the field. Any experienced manager involved in a $4 million lab renovation project has experienced large sums of money being spent with final end-user changes made just before occupancy. Illustrating and discussing the final product at CD phase rather than occupancy phase will significantly reduce the cost impact of these changes.

The entire lab/office building/floor would not need to be modeled, since there can be repetition in lab design. Key areas are identified by the team in advance of issuing the BIM documents. In the proposed project scenario noted above, if the project team identifies 5,000 square feet of VR lab models, it should suffice to capture the key areas of the design that would involve the highest chance of design change. Models of labs, lab support areas, and equipment zones would be the likely targets.

If the project allows a VR budget of $25,000 to construct the VR laboratory models, one could easily comprehend how this design tool would have a great return on investment. Saving at least $25,000 worth of changes on a $4 million lab renovation project is not hard to conceive.

Using VR for lab equipment placement

All lab designers make every effort to accurately and logistically place the lab equipment on the scaled plans. Particular attention is given to fixed or non-benchtop equipment that cannot easily be moved. After a number of equipment placement review meetings with the research teams, the teams are asked to sign off on the equipment 2-D plans so they can be incorporated into the construction documents.

"All lab designers make every effort to accurately and logistically place the lab equipment on the scaled plans."

All lab designers and other members of the project team have had to change or relocate lab equipment on a project once 2-D becomes 3-D. Usually this relocation exercise occurs after the walls are up and the utilities are roughed in, going from 2-D to 3-D in the minds of the researchers. Or in a worst but all too common case, the PI team walks through the space before occupancy and requests changes prior to relocation the following week.

Consider the communicative power of being able to illustrate the final equipment placement in the lab and have the PI team not only sign off on the design but also be able to relocate equipment in a full-scale collaborative design session if necessary. This virtual walk-through occurs not a week or two before occupancy but at the CD stage of design. Hence, any utilities, casework, walls, ceilings, or floor modifications are addressed as edits on the plans.

Lab designers serve the greatest scientific minds in the world. All too often these brilliant minds have difficulty visualizing 3-D spatial requirements in 2-D paper documents. This 3DVR visualization design tool can assist in allowing the PIs and their teams to communicate their intents to the lab designer graphically. This equipment relocation process can be accomplished by using a wand that allows the viewer to pick up equipment and place it in its new home. Door swings, heights, dimensions, adjacencies, and configurations can be confirmed at full scale. No interpretation by researchers is required; this allows the design team to "edit" the equipment locations *prior* to construction. This software will allow input of new items not on the plans, such as eyewash stations, showers, outlets, water systems, sinks, etc.

▲ *Using VR wand to place lab equipment (-80 freezer)*

Lab design collaboration

Lab design and team collaboration is at its best when the entire PI staff can stand in the 3DVR space, move around as if they were in the actual lab, and communicate any changes to the attentive designers who are watching the interaction. Screen shots are taken, saved, and sent to the designers for incorporation into CDs.

Another example of the usefulness of this design tool is the ability to drop in alternative designs by using a hand controller or wand. Designers can offer several alternative designs for PI consideration. For example, alternates could include casework types (metal versus wood), shelving types/heights, and lighting, floor and wall types, all of which can be called up by the viewer instantly.

▲ *Team Design using a VR CAVE.*

The next example of excellence in collaborative lab design is multiple team locations for a project. Today's state-of-the-art research laboratories often involve several team consultants along with the A&E team. Rarely if ever are they in the same geographic location. Let us consider the impact of using this technology for a lab design that is

being implemented over distances, time zones, or even different countries. These VR systems can allow the client teams to have a simultaneous viewing as they "walk" through the labs. Use of VR models has the added benefit of reduced travel times/costs, reduced design documents, and reduced production costs.

Summary

- Physically walk around the lab with motion-tracking integration software at the CD stage of design
- Visualize multiple design alternates (equipment, adjacencies, exteriors, floor plans, lighting schemes, interior design layouts, etc.) in real time
- Add/delete customizable 3-D props (equipment, outlets, specialty gas sources, exhaust points, avatars, etc.) within your environment instantly
- Mock up large spaces such as collaborative-interactive zones, atrium, etc.
- Collaborate with multiple users in single or multiple settings
- Use existing 3-D models created in major architectural design programs such as Revit, AutoCAD, 3D Studio Max, SketchUp, and many others
- Use very sustainable design
- Gain cost-effective, near-immediate ROI
- Have powerful and effective design communication

The future of VR design

It was not too long ago that CAD became commonplace in all design firms, and it is now the norm for all projects, large and small. Many readers can remember when BIM was not a common collaborative experience on every project as it is today. Clients expect lab designers to bring the best tools to the benchtop to ensure their project goals are realized and the scientists that we serve can have the most efficient, most cost-effective, and most productive laboratories for their research endeavors. The use of VR for lab design is one of those tools, and it is the opinion of this author that not too far into the future the use of VR design will be just as commonplace as CAD and BIM are today.

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ONE LIMS, ONE LOGIN, ONE ORGANIZATION

ESSENTIAL COMPONENTS FOR COLLABORATIVE NETWORKS IN TRANSLATIONAL RESEARCH

By Jessica Guzman, Deborah Mossbrook-Davis, Cornelius F. Boerkoel, MD, PhD, and Thomas Dolan

Translational research applies the findings and tools of science to define and solve problems. Inclusive of characterizing the problem, defining its cause, clarifying a solution, and sharing that solution with wider society, the classical arc of translational research is often prolonged and dependent on financial and intellectual champions. The need for scalable translational research is acutely apparent, and creating an informatics tool fit for this work becomes absolutely necessary.

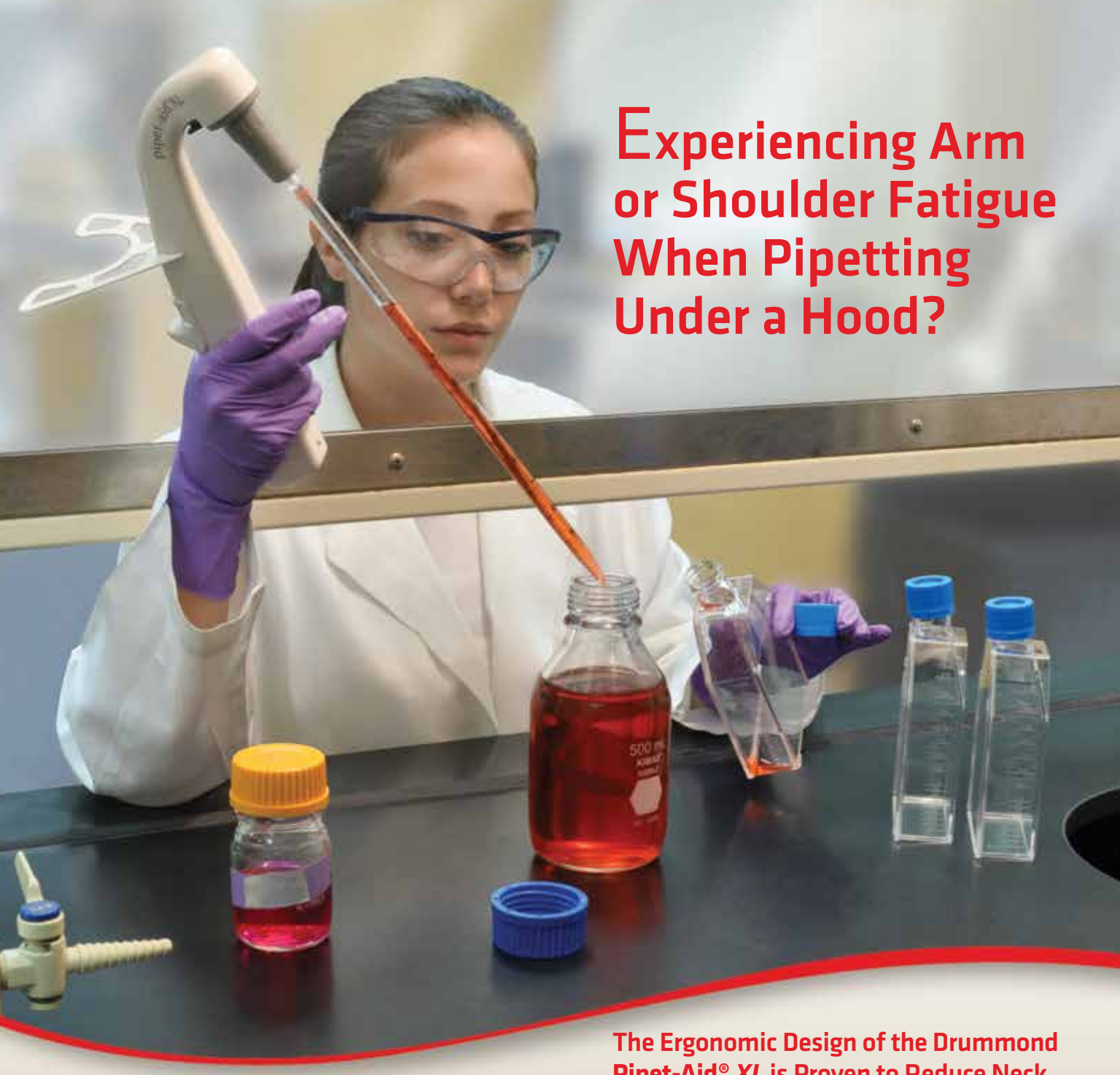
Historically, humans have solved complex problems such as those of translational research through the distribution of cognitive processes across environments and social groups. Modern technology can distribute such cognition to virtual social groups. Whether physical or virtual, social groups represent a structured, participatory, transparent, and communal space for the exchange of knowledge. Recognizing that virtual social groups are applicable not only for scaling translational research but also for creating a successfully collaborative work environment, the National Institutes of Health Undiagnosed Diseases Program (NIH UDP) developed the Undiagnosed Diseases Program Integrated Collaboration System (UDPICS).

UDPICS is founded on the idea that knowledge is shared among translational researchers and their various experiences and environments, rather than merely confined to one individual. For this reason, the supporting informatics infrastructure creates a culture of collaborative information sharing and interaction. Despite knowledge, skill, and cultural differences among different users, UDPICS bridges these differences through 1) clearly delineated social relationships, 2) shared foundational knowledge, 3) facile communication in a common nomenclature, 4) accountability and maintenance of quality standards, and 5) intuitive usability. These characteristics, which create a social network founded on trust, respect, and appreciation, enable distributed cognition for problem solving. By uniting globally dispersed experts into virtual collaborative networks under a common goal, UDPICS enables scalable translational research.

> "The classical arc of translational research is often prolonged and dependent on financial and intellectual champions."

Echoing the attributes of a physical social group, UDPICS forms virtual social networks modeling traditional social hierarchy. Privileges conceptually similar to those defining relationships in other social groups are provided by permissions in UDPICS and determine access to data, functions, and requests. These are assigned according to the role or needs of the user; each successive role is associated with more permissions. These roles reflect those of social groups; namely, initiator-contributor, procedural technician, orienter, integrator, opinion giver and opinion seeker, and information giver and information seeker. This integration of defined social hierarchy within UDPICS promotes a transparent relationship among users that leads to scaling of virtual collaborative networks.

The centralization of information related to a patient within UDPICS provides a foundation that encourages discussion of perspectives and fosters creativity



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and innovation. To this end, the UDPICS ecosystem contains an inventory system for biospecimens, an inventory system for model organisms, an electronic laboratory notebook, a human phenotyping tool, and a next-generation sequencing analysis tool. Clinical research teams, laboratory researchers, and bioinformatics analysts alike use this system collaboratively to record, track, and manage patient-centric research data with standardized nomenclature and terms.

Virtual collaboration within UDPICS facilitates participatory modes of study and research. Furthermore, the organization of data and knowledge within UDPICS makes it an archive for knowledge and skills from past experiments as well as for established social networks of prior collaborators. This enables future problem solving through application of experience and nonproprietary physical and intellectual assets created in prior collaborative processes.

Integrating distinct social groups requires a common language for understanding, communication, and productivity. Clinicians and laboratory scientists speak different languages, particularly regarding disease phenotype; therefore, to facilitate communication, UDPICS includes tools for ontology and collaboration. These integrated systems describe human features and model organism features, while another integrated application then translates features recorded in ontologies to traits expected in other organisms, facilitating decisions on the best animal model to generate for a disease.

"Virtual collaboration within UDPICS facilitates participatory modes of study and research."

A social network with shared data and language achieves effective coherence and agency within an organization if there are robust communication tools. UDPICS has several communication functions, including chat, a to-do list of tasks with associated time frames, an Activities List customized to a user's interests, and email notifications for urgent items.

Productive organizational cultures frequently have a clearly defined mission shared by participants who understand their roles and strive to achieve the goals of the organization. Within UDPICS, workflows are designed to achieve the goals of the NIH UDP and tasks are assigned according to a user's role or responsibility. Additionally, given that open and negotiable infrastructure development reflecting user practices and perceptions is more successful at getting user adoption, UDPICS has multiple functions enabling facile evolution of interfaces and workflows to satisfy users' needs.

In summary, achieving the enhanced level of collaboration required for scalable translational research is impossible if participants operate independently using separate systems to manage disparate repositories of information. As problem solving throughout the greater scientific community increasingly depends on partnerships, support of distributed cognition through virtual social networks becomes mandatory, and UDPICS is a solution.

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LEED®ING THE WAY

INDOOR AIR QUALITY COMMISSIONING TO PREVENT ISSUES AFTER NEW CONSTRUCTION OR RENOVATIONS

by Vince McLeod

As a certified industrial hygienist practicing comprehensive health and safety at a major university, I have noted one area that consistently accounts for a majority of complaints and investigations: indoor air quality issues. Sure, requests flood our offices during the peak allergy seasons of spring and fall. But even in off seasons, we are constantly dealing with issues of poor or degraded indoor air quality. Why is this?

You have probably guessed the answer already: subpar indoor air quality (IAQ) management during new construction or renovation activities. Most off-season complaints originate from newly constructed or recently renovated work areas that are now newly occupied. However, with a little attention paid to building quality ventilation and heating, ventilating, and air conditioning (HVAC) systems, many of these problems can be avoided or eliminated.

IAQ, now more accurately referred to as indoor environmental quality (IEQ), has risen to the top of the list of worker complaints in the past decade. This is not surprising given that the U.S. Green Building Council (USGBC) and the U.S. Environmental Protection Agency now estimate that Americans spend an average of 90 percent of their time indoors, where potential contaminants and pollutant levels may be two to five times higher than outdoor levels.[1] Add to this that an estimated 17 million Americans suffer from asthma and 40 million have allergies and you can easily see why indoor air quality is garnering so much attention.

IEQ involves many different parameters including temperature, relative humidity, odors, lighting, and even ergonomics, in addition to potential contaminants. The one contaminant receiving the most attention is mold; however, guidance on dealing with these issues will be a topic for future columns. Our focus here is how to minimize, or eliminate, IEQ problems associated with new construction to ensure that these areas are ready for occupation.

We begin with a comprehensive strategy for optimizing indoor environmental quality and minimizing potential problems from poor indoor air quality. Our IEQ management approach is based on the USGBC's Leadership in Energy and Environmental Design (LEED) program,[2] with a couple of important additions from the American Society of Heating, Refrigerating and Air-Conditioning Engineers' (ASHRAE's) *Standard for Acceptable Indoor Air Quality, 62.1-2013*.[3] The LEED IEQ strategy addresses many areas, including meeting minimum indoor air quality performance standards, controlling environmental tobacco smoke, using low-emitting materials, increasing ventilation effectiveness, controlling chemical and pollutant sources, addressing thermal comfort, and optimizing the use of daylight, among others. ASHRAE's standard concentrates on ventilation performance. We are going to focus on IAQ performance and assessment, which we refer to as IAQ commissioning—the testing of IAQ performance.

IEQ management plan/IAQ commissioning

Ideally, your construction IEQ management plan is a simple guidebook for ensuring that indoor air quality is acceptable following construction and prior to occupancy. We all know that construction activities produce a myriad of potential problems. In addition to the normal heavy particulate loads from constantly moving in and out, handling and installing building materials, preparing the site, and even cleaning and sweeping up, contaminants can also accumulate during the course of a project. These

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Based on data from internal testing and The University of Michigan field study, published in American Biotechnology Laboratory

might include chemical pollutants or volatile organic compounds (VOCs) given off by building materials, as well as dust, pollens, and other particulates that enter from outside. The goal of the construction IEQ management plan is to reduce potential indoor air quality problems resulting from construction or renovation activities.

Under the LEED rating system, two options are provided—either a building flush out or IAQ commissioning (or testing). A brief description of a building flush out is provided; however, we believe you will agree with us and gravitate toward IAQ commissioning for your projects. We have modified the LEED testing to include a few parameters from ASHRAE that we feel are critical.

Building flush out

A building flush out is achieved by running the HVAC systems until a large amount of outside air has been delivered to the space. In following the LEED program for new construction or major renovations, the HVAC system is set for 100 percent outside air and operated continuously until 14,000 cubic feet (ft3) of outside air is delivered for each square foot (ft2) of new floor space. This can take a period of weeks, depending on HVAC system design, even when running 24/7. During flush out, the temperature must remain at least 60°F and the relative humidity cannot exceed 60 percent.

An alternate procedure is provided under LEED-New Construction that allows for quicker occupancy. This option permits the space to be occupied after flushing just 3,500 cubic feet of outside air per square foot of floor space, provided ventilation continues each day beginning three hours prior to occupancy and throughout normal occupancy hours, until the 14,000 ft^3/ft^2 is reached.

IAQ commissioning

Because of the time and expense of conducting a building flush out, we prefer the second option of IAQ commissioning. Performing baseline indoor air quality testing demonstrates that certain common indicators do not exceed recommended maximum concentrations. Following our protocol, the indoor air is sampled for formaldehyde, total particulates, total VOCs, carbon dioxide, carbon monoxide, relative humidity and 4-phenylcyclohexene (4-PCH). Sampling for 4-PCH is required only if carpets and fabrics containing styrene butadiene rubber latex backing were installed as part of the base building systems.

In order to collect accurate and representative data, the testing must be conducted prior to occupancy and during normal occupancy hours. All HVAC systems must be operated at the normal daily settings (including the minimum outside airflow rate) during testing. All interior finishes must be installed. The number of sampling locations depends on the building size and the number of separate ventilation systems. Sampling should be done for each portion of the building served by a separate HVAC system and include at least one location for every 25,000 ft^2. More samples or sampling locations may be required to assess the area with confidence. Finally, all samples should be collected from between three and six feet above the floor, the area representing the occupant breathing zone. The table below provides the maximum allowable concentrations for the recommended commissioning parameters.

PARAMETER	MAXIMUM ALLOWABLE CONCENTRATIONS	RATIONALE
Formaldehyde	0.027 parts per million (ppm)	Off gases from many different building materials; severe irritant and sensitizer; probable carcinogen
Particulates (PM 10)	50 micrograms per cubic meter (ug/M3)	Introduced by many sources during construction; inhalation hazard; possible irritant
VOCs	500 ug/M3	Off gases from many different building materials; various effects resulting from irritation to the central nervous system (CNS)
Carbon Dioxide	<= ambient + 700 ppm	Ensure proper ventilation and percentage of outside air; performance indicator for HVAC
Carbon Monoxide	4.0 ppm	Produced by combustion sources; serious asphyxiate
Relative Humidity	<60%	Ensure proper HVAC performance; minimize mold growth
4-PCH	6.5 ug/M3	Off gases from specific materials; mucous membrane irritation, headaches, other possible CNS effects

One downside to performing IAQ commissioning is the possibility of a parameter(s) exceeding the recommended limits. Should this occur, simply conduct additional flushing and then retest for only the specific contaminants found above the maximum levels.

References

1. *LEED Reference Guide for Green Building Design and Construction.* U.S. Green Building Council. Washington, DC. 2009. http://www.usgbc.org/resources/leed-reference-guide-green-building-design-and-construction

2. *LEED 2009 for New Construction and Major Renovations Rating System.* Version 2009. U.S. Green Building Council. Washington, DC. April 2013. http://www.usgbc.org/resources/leed-new-construction-v2009-current-version

3. *Ventilation for Acceptable Indoor Air Quality,* American Society for Heating, Refrigerating and Air-Conditioning Engineers. Atlanta, GA. 2013. https://www.ashrae.org/resources--publications/bookstore/standards-62-1--62-2

Additional resources

Indoor Air Quality. U.S. Environmental Protection Agency. Washington, DC. December 2008. http://www.epa.gov/iaq/

Indoor Environmental Quality. Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. Atlanta, GA. June 2013. http://www.cdc.gov/niosh/topics/indoorenv/

Vince McLeod *is the founder and senior member of the Safety Guys and an industrial hygienist certified by the American Board of Industrial Hygiene. He currently serves as the senior industrial hygienist in the University of Florida's Environmental Health and Safety Division. He has 27 years of occupational health and safety experience at the University of Florida, and he specializes in conducting exposure assessments and health hazard evaluations for the university's 3,000-plus research laboratories.*

SAFETY TIP

PROVIDE ADEQUATE SUPPLIES OF PERSONAL PROTECTIVE EQUIPMENT

By James. A. Kaufman

Employers are responsible for ensuring that personal protective equipment (PPE) is available. Employers are also responsible for ensuring that employees are using these devices. If employees provide their own safety equipment, the employer is responsible for ensuring that it is appropriate. Respirators must be provided by the employer.

As part of both 29CFR1910.132 compliance and its chemical hygiene plan, the employer needs to specify the circumstances under which an employee should use PPE. When should safety glass versus chemical splash goggles be worn? When should gloves be used? What about lab coats and portable shields? Is hearing protection an issue? Should hearing protection devices be used?

The employer has an additional responsibility. The employer needs to make sure that the PPE is used. Working safely should be a condition of employment. Employees who fail to use required PPE should receive appropriate warnings, disciplinary action, and then be dismissed.

Any policy that falls short of providing for the provision of dismissal is inviting violations that cannot be addressed and prevented. It allows employees to jeopardize their own health and safety and that of others around them without the possibility of necessary disciplinary action. Normally, it will not be necessary to invoke this final action. However, the availability of the sanction improves the compliance efforts.

The OSHA Personal Protection Standard requires employers to do workplace hazard assessment to determine the protective equipment needed. The employer must then provide the equipment and train employees in its use.

Source: Kaufman, James A., Laboratory Safety Guidelines - Expanded Edition, The Laboratory Safety Institute, www.labsafetyinstitute.org.

Harm Moes

ASK THE EXPERT

WRITING THE PERFECT CHROMATOGRAPHY METHOD by Rachel Muenz

Harm Moes is technical support engineer at SGS in the Netherlands. Mr. Moes has 13 years of experience in analytical instrumentation and held several technical positions with an analytical instrument supplier before joining SGS. At SGS, he provides technical support to the SGS oil, gas, and chemical labs in the Netherlands. That includes implementation and validation of new instrumentation, techniques, and methods, and instruction and training of laboratory personnel.

Q: What does SGS do?

A: From our beginnings in 1878 as a grain inspection house, we have steadily grown into our role as the industry leader. Our core competencies in inspection, verification, testing, and certification are being continuously improved to be best-in-class. They are at the heart of what we are. Our chosen markets will be solely determined by our ability to be the most competitive and to consistently deliver unequalled service to our customers all over the world.

SGS has its headquarters in Geneva and is listed on the Swiss Exchange. SGS has become the world's leading inspection, verification, testing, and certification company. We are recognized as the global benchmark for quality and integrity. With more than 80,000 employees, we operate a network of more than 1,650 offices and laboratories around the world. The current structure of our company consists of ten business segments operating across ten geographical regions.

Q: What does your laboratory do?

A: We are in the oil, gas, and chemical business. If there's one party buying a shipment and another party selling it, we're the intermediary party that's checking the quality and quantity of the product, either chemicals, petrochemicals, or the LPGs [liquefied petroleum gases]. We receive materials we don't know much about and we test them against specifications. Those are typically sales specs or customer certifications on purity, impurities, and physical characteristics. Petrochemical testing involves a lot of gas chromatography (GC) work.

> "You need sufficient separation of the components you're interested in, so it depends on whether you're doing purity analysis or impurities."

Q: What are the most important things to consider when you're writing/developing a new gas chromatography method?

A: First of all, you need sufficient separation of the components you're interested in, so it depends on whether you're doing purity analysis or impurities. If you're doing a purity analysis or composition, it's [more focused] on the distribution of the different components you're after, so you need sufficient separation to identify the components. If you're looking at specific impurities, it's sometimes easier to separate them from a matrix although it might require more advanced techniques like backflash, heart-cut, or multidimensional techniques but if you want to know purity, you need to consider all of the components in the matrix and that can be quite challenging to have it done in a single run. The second thing for our operation is that [the method] must be robust. We're a 24/7 operation and the technicians have a lot of different techniques they have to work with, so it needs to be robust. Once it's set up, we don't need to go to the lowest detection limits, but the method needs to be stable and robust to run for 24/7 operations.

Q: What can happen if your method is flawed? How can you tell if it is flawed?

A: Well, the party on the other side, the receiving party for instance, would find different results and they would start questioning our results and that can result in claims and legal situations that can cost millions of dollars. That's one of the worst things that can happen based on our results.

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Q: How do you avoid those issues?

A: There's always an analytical answer for these kinds of things. On one end, you want to try to ensure you do the same things from different sides of the job, if it's on different sides of the ocean, for example. We try to work as much as possible with international standardized methods but it's not always possible because there are not always methods for the kinds of products or impurities [the customer is] looking at. In that case, we have to develop something ourselves. That's challenging because you can be confident about your own results and you can try to do all kinds of evaluations and validations, but you cannot control what's happening on the other side. That means everything we do has to be traceable against standards, references, or complementary techniques.

"The method needs to be stable and robust to run for 24/7 operations."

Q: What are some resources that you've found to be useful when creating new methods?

A: All different types of publications, such as journals for chromatography or online journals with examples for actual products, not just standards. Every GC column or instrument comes with an ideal picture of reference standards, but I need chromatograms of real materials, for instance, or application notes of actual samples. It doesn't have to be ideal separation but it gives me an idea of what might be possible and maybe I can improve on that. Publications about new techniques, new detectors, those are the kinds of things I'm looking at.

Q: Where do you see chromatography method writing/development going in the future? Where are things moving in your field?

A: In our field, I think our lab is quite ahead in data processing and software but I see that in our market as a whole, a lot is still being done by manual calculations and that can lead to a lot of errors. What I've found is that if you can automate a lot of these calculations, using platforms such as software and data systems, that can take a lot of work from the analysts, and a lot of errors out of the work. These platforms are there already in the pharmaceutical industry, which is far ahead of us so I think we can learn a lot. But in our business and operations, we're always shying away a little bit from LIMS systems, because if your LIMS system breaks down, you cannot do anything. On the method development side, we're looking for suppliers that can help us with that, suppliers that provide instrumentation that is configured and tested based upon our specifications. We try to give some of the basic configuration and method development to the suppliers. We outsource that kind of work so that means when they come with an instrument, it's really plug-and-play—the proper columns are in there, they do the calibrations and some of the validations and that takes time away from us.

***Rachel Muenz**, associate editor for* Lab Manager, *can be reached at rachelm@labmanager.com or by phone at 888-781-0328 x233.*

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INSIGHTS ON BIG DATA IN DRUG DISCOVERY

A COMBINATION OF COMPUTATIONS AND SIMULATIONS WILL CHANGE TOMORROW'S HEALTH CARE

by Mike May, PhD

Big data might bring more benefits to drug discovery than to any other field. For one thing, discovering a new drug turns out to be incredibly difficult. On average, a pharmaceutical company tries about 10,000 drug candidates for every one that ends up on the market. Plus, the process of discovering and developing a new drug costs hundreds of millions of dollars and takes more than a decade—some say more for both measurements. To make this entire process more efficient and economical, pharmaceutical scientists want to find the most promising drug candidates—ones that are the most likely to be safe, effective, and affordable. Some experts believe that large datasets, and knowing how to make the most of them, can create a more targeted approach to discovering tomorrow's drugs.

The concept of big data covers a wide range. For this article, let's just think of big data as a complex dataset that could be tricky to handle, and what is "big" for one application could vary considerably from the next. Also, many modern tools—such as next-generation sequencing (NGS) platforms that speed up and reduce the cost of gathering information about someone's genome—pump out data at a rate that was unimaginable even a few years ago. That makes more data than ever available, and the volume grows every second. Consequently, it's easier to get the data than it is to make the best use of it. That could be the most complex part of applying big data to drug discovery.

When asked about the key benefits of applying big data to drug discovery, Niven Narain—cofounder, president, and chief technology officer at Berg, a biopharma company in Framingham, Massachusetts—says, "Patient and disease biology are both pretty complex." He adds, "Trying to distill the disease into a neat hypothesis-driven scientific explanation often falls short of what the true story is."

With big-data tools, pharmaceutical scientists hope to learn more about human biology and disease, plus which drugs could do the most good.

ADDING INTELLIGENCE

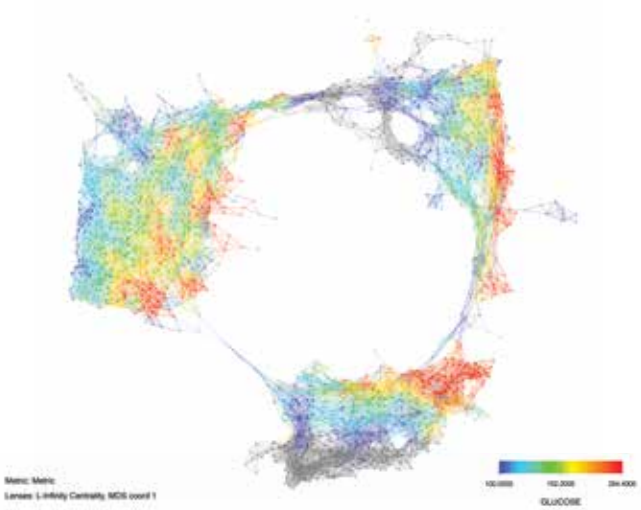
"It's easy now to create big data," says Narain. Turning those data into an actionable endpoint for a physician, researcher, or patient is the challenge. "That takes an analytical platform," he says.

Narain and his colleagues developed such a platform based on artificial intelligence. This system starts with human tissue samples and analyzes them with genomics, clinical data, and so on. Then, this platform explores the data for patterns in healthy and diseased samples, in search of the key differences. In addition, this technology can look at samples of a patient's disease over time. Doing all this takes the power of a supercomputer, because this platform often deals with as many as 14 trillion data points for one tissue sample. To do that, Berg runs some of its own high-performance computing clusters, or sometimes purchases computing time from Amazon. "Amazon has become so inexpensive to use that we mix and match ours with theirs," says Narain.

In addition, Narain says, "We have the capability to put this data together to explore potential drug targets or look for diagnostic biomarkers." The targets can then be used in drug discovery to find a compound that can attack key aspects of a disease. The biomarkers can be used in many ways, from tracking the efficacy of a drug to stratifying a patient population in a clinical trial.

Narain and his colleagues call this proprietary approach interrogative biology. In short, they are interrogating healthy and diseased biology, as well as the resulting data, and combining that information and more to, for one thing, try to find the best drug for a very specific disease. For instance, Berg's scientists developed a model of Parkinson's disease from samples of people from 40 to 90 years old and beyond. The database is stratified by age, gender, and response to L-dopa, a drug that can slow the disease in some cases. "From this," says Narain, "we can show the various stages of the disease. We can

▲ *Scientists at Berg start with human tissue samples, collect many kinds of data on them, and then use advanced algorithms and supercomputers to find crucial differences between healthy and diseased samples. (Image courtesy of Berg.)*



▲ *Ayasdi's Topological Data Analysis (TDA) reveals hidden relationships in complicated data sets, which can be used to develop new treatments. (Image courtesy of Ayasdi.)*

look at it from a molecular basis." That could lead to the discovery of new drugs that change how physicians treat Parkinson's disease.

Other organizations can also benefit from this tool. To get access to Berg's technology, a pharmaceutical company or major university can, for example, license one of Berg's drug targets or drug candidates to work in collaboration.

SAMPLING SHAPES

Other companies are also developing sophisticated tools to discover new drugs. In Menlo Park, California, for example, scientists at Ayasdi use topology—the study of shape—to analyze data, which provides a way for scientists to find subtle, often hidden relationships in complex datasets.

As an example, Ayasdi's scientists applied TDA (topological data analysis) to a gene-expression breast cancer dataset collected more than ten years ago at the Netherlands Cancer Institute (NKI). "We found insights within minutes using TDA and advanced machine learning," says Devi Ramanan, Ayasdi's head of collaborations. "We identified a previously unknown subgroup of oncology survivors who exhibited particular characteristics—genetic indicators of poor survivors—which will allow us to better understand this group and potentially help improve survival rates for this disease, which might potentially help us find a cure."

To expand the use of TDA, Ayasdi develops collaborations with other organizations. In these collaborations, Ayasdi provides software, training, and support. "You don't need to be a data scientist or computer scientist to use our software," says Ramanan. "You only need to understand your data." At the time that Ramanan talked with *Lab Manager*, Ayasdi had collaborations with more than 40 organizations.

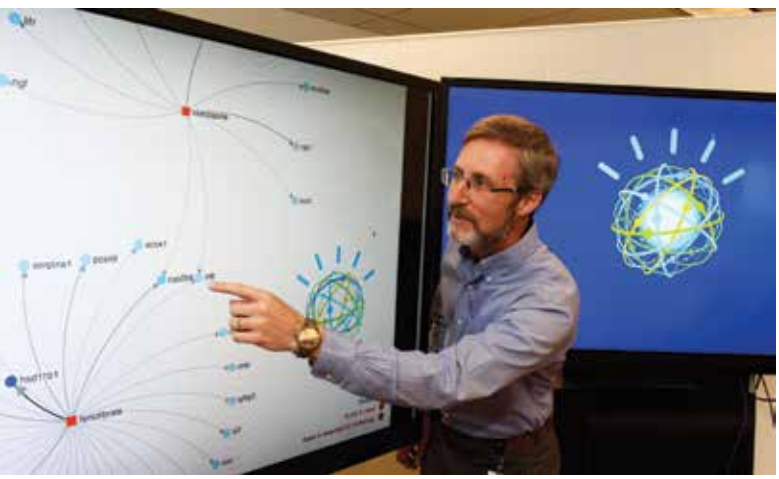
According to Ramanan, researchers can use TDA to find crucial insights that previously eluded them due to the complexity of their data. Ayasdi's collaborators, for example, have frequently been able to leverage more traditional techniques to verify and extend their initial findings using TDA.

TEXT TO TREATMENT

As the previous examples show, the use of big data in drug discovery often requires a combination of fields. Scott Spangler—now a principal data scientist at IBM Watson Innovations in Almaden, California—got started, unknowingly, on such a combination when he was doing

text mining in the pharmaceutical industry. This included chemical analysis, like mining text for different names used for the same formula.

Now he uses some similar thinking with IBM Watson, which is the computer that defeated two former *Jeopardy!* champions in 2011. Now IBM applies Watson to health care, among other things. For example, in collaboration with Baylor College of Medicine in Houston, Texas, IBM aimed Watson at molecular biology. Spangler says, "We spent a few years training Watson to understand biology—to think in terms of the physical objects, like the chemicals, and targets, like proteins in a cell." He adds, "We also taught it to understand the disease or condition that you are trying to alleviate with the drug." In addition, this technology can help pharmaceutical scientists pick the best drug targets.



▲ *Scott Spangler, principal data scientist, IBM Watson Innovations, demonstrates how IBM Watson cognitive technology can visually display connections in scientific literature and drug information. Here, Watson displays protein pathways that can help researchers accelerate scientific breakthroughs by spotting linkages that were previously undetected. (Image courtesy of Jon Simon/Feature Photo Service for IBM)*

To take on these challenges with computation, scientists need large datasets. As Spangler says, "Biology is very hard and very statistical." He adds, "You can't think of it like computer science, with a direct cause and effect. It doesn't work that way." A molecular process that works one way now could work differently an hour from now or in a different person. This creates very noisy data.

That's exactly what Watson tackles. It tries to quantify confidence. As Spangler asks, "How certain are we of various conclusions? Where can we find corroborating evidence?"

In particular, scientists can use big data for drug discovery with IBM's Watson Discovery Advisor. This is available through a browser as software as a service. So anyone can use it to test hypotheses virtually, all based on the data in millions of published papers. As Spangler says, "Watson digests way more information than a human expert can, and it can help them be better scientists and make better predictions moving forward."

> "Winnowing the many pieces down to the useful ones gets underemphasized."

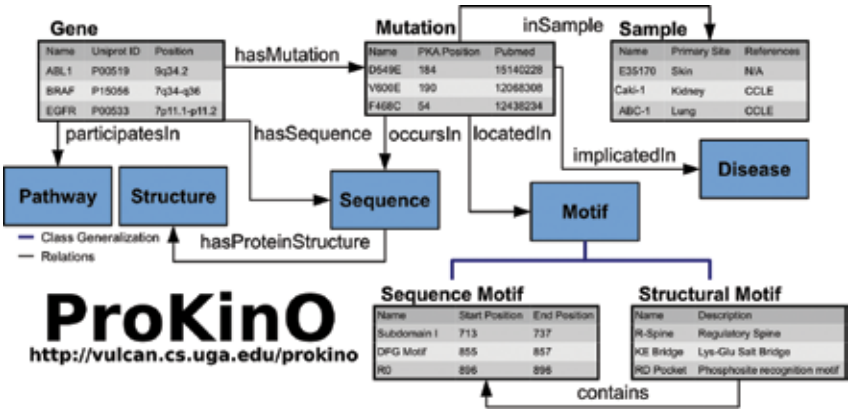
CALCULATING THE KINOME

A kinase is a protein enzyme that drives changes in the structure of another protein by adding a phosphate group. Typically, this changes the function of the protein. Consequently, many drugs target kinases, and these proteins could provide even more drug targets ahead. An organism's collection of kinases makes up the so-called kinome.

Daniel Ian McSkimming, a doctoral candidate in the Institute of Bioinformatics at the University of Georgia at Athens, and his colleagues are mining the human cancer kinome—all of the cancer-related kinases. When asked how much data this involves, McSkimming says, "It's an ever-increasing amount." Humans have about 500 kinases, and they can be regulated in problem-causing ways in cancers. In addition, the cancer kinome includes thousands of different forms of kinases, caused by something tweaked in a kinase's structure, often altering the kinase's function. That complicates any effort to keep track of the kinases, their variants, how they relate to cancer, and so on.

To take on that problem, McSkimming and his colleagues created ProKinO (http://vulcan.cs.uga.edu/prokino), which is freely available. With this knowledgebase, a user can explore functional information about kinases, as well as mutational information, information related to specific cancer cell lines, how kinases impact resistance to specific cancer drugs, and more.

"This tool gives you the ability to see how kinase researchers think about kinases," McSkimming says. "It will help you understand the regions of the proteins that have been experimentally identified as important, and this can directly inform drug research on how to inhibit a kinase."



▲ *ProKinO provides connected information about human cancer-related kinases, which could help drug researchers discover potent inhibitors. (Image courtesy of Daniel Ian McSkimming.)*

ProKinO will keep growing. McSkimming says, "It's crucial that we add to it, and we'll find both new types of analysis and new types of data."

FOCUS ON THE FUNCTION

In all cases, big data is of use only when you know what to do with it. For example, Jordan Stockton, director of marketing for enterprise informatics at Illumina in San Diego, California, says, "Winnowing the many pieces down to the useful ones gets underemphasized."

That step requires software that many people can use. For example, Illumina's NextBio lets a scientist use genomic data at nearly any stage of drug discovery or development. For instance, this platform provides genomic data from cell lines that can be used to study specific drug targets.

Tools like NextBio and others mentioned here will become increasingly valuable in drug discovery. As Naomi O'Grady, marketing manager, oncology at Illumina, explains, "The discovery-to-drug process is like a funnel." That is, researchers tend to work on more focused datasets as the process moves forward. Nonetheless, O'Grady points out, "But even at the bottom end of the funnel, the amount of information being considered is getting bigger. More information is being considered at every step."

Consequently, pharmaceutical scientists will need ever more data to make the most of the existing knowledge base. They will also need sophisticated tools that pick out the key data and the interconnections. Only then can large datasets turn drug discovery into an efficient and effective process.

Mike May *is a freelance writer and editor living in Ohio. You may reach him at mike@techtyper.com.*

TITRATORS

COMPLIANCE BASED ON BEST PRACTICES

by Angelo DePalma, PhD

When the U.S. Food and Drug Administration promulgated its good laboratory practices (GLPs) for animal toxicology labs in 1979, the regulations were considered a breakthrough in compliance assurance. As GLPs expanded to include all instrument and non-instrument operations, in tox labs and beyond, other U.S. agencies, most notably the U.S. Environmental Protection Agency, adopted the idea. The original GLPs spawned regulatory and standards practices worldwide whose goals were to improve quality through best practices.

Quality in, quality out

GLPs' inputs are best practices, and their output is data quality. A key component relates to 21 CFR Part 11, promulgated in 1997. Part 11 covers electronic records, signatures, and related computer systems. George Porter, product manager for titration at Metrohm USA (Riverview, FL), refers to the regulation as "the gold standard of compliance." Adhering to it, he says, ensures compliance with most if not all U.S. regulatory bodies "because Part 11 is a very stringent standard."

At one time, all recordkeeping and compliance recording were done by hand in paper notebooks and on forms. Today, even labs lacking a Lab Information Management System (LIMS) or an electronic lab notebook (ELN) are computerized.

"That's why customers should look for systems with built-in traceability and compliance aids," Porter says. Software and touch panel-controlled firmware can even assist with operations crucial to GLP compliance. "It goes well beyond electronic signatures. The software can tell if you're using the right burette, electrode, reagents, even the right method. Many modern titrators have this ability built in."

Metrohm embeds microchips into its components, peripherals, and systems to ensure that the right components are used with the right method. Parts identify themselves through unique serial numbers. Systems will not operate when components are incorrect or past their calibration dates. Users obtain the equivalent of a full system compliance audit every time they turn the titrator on. "In the past you had to keep track of and record this information on paper. Now the titrator does it for you," Porter adds, "and a computer is not even required in order to be in compliance."

To Robert Menegotto, president of MANTECH (Guelph, ON), GLP is a broad term that encompasses best practices followed in many industries that use titrators. "As long as you can demonstrate a year from now that you were following procedures that gave you the best chance for a correct answer, you are probably following GLPs."

This means calibrating key components and maintaining a history of calibration and quality checks; for example, ensuring that burettes have been validated for dispensed volume within a timeframe specified by the protocol. And, importantly, demonstrating that all users have followed the manufacturer's maintenance recommendations.

"As long as you save this information in a database or log and can prove down the line that the record has not been tampered with, you've likely covered your validation requirements," Menegotto tells *Lab Manager*.

He advises potential purchasers to acquire software that handles most routine compliance tasks automatically.

Users still need to make up and run standards, "but the software should remind operators and management to complete those tasks, and to keep track of burette calibration, titrant standardization, and electrode calibration. Operators should not have to worry about [these things]."

Compliance software should interface with LIMSs and ELNs in both workflow directions. A LIMS, for example, can generate worksheets containing automated quality check standards and collect and process data as each sample runs, not only when the batch is completed.

The critical ingredient for such automation, Menegotto says, is simplicity. Otherwise, the benefits of automated recordkeeping are squandered through human error and/or lack of compliance.

Instrument tips

"Good compliance begins with good recordkeeping and good instrumentation," says John D. MacFarlane, applications support specialist at JM Science (Grand Island, NY). The company is the exclusive importer and distributor of the AQUACOUNTER® titrator line manufactured by Hiranuma (Ibaraki, Japan). Kenichi Hiranuma, president, offers the following instrument-related tips to facilitate GLP compliance:

- Electrodes: Record electrode(s) type, starting date of use, and manufacturer data such as lot number. These data provide reference points for documenting subsequent maintenance and testing activities.
- Burette: Record the starting service date and total dispensed quantities. For reliability checks, fill burettes with pure lab water and dispense quantitatively into an appropriate tared weighing vessel. Confirm repeatability and accuracy by measuring dispensed weight. Hiranuma recommends following burette practices outlined in JIS K 0050:2011, *General Rules for Chemical Analysis* from the Japanese Industrial Standards Committee. Other official or unofficial standards are acceptable as well. Also, confirm operation of the burette sample changer.
- Calibration and error history: Saving past pH calibration data reveals the point in time when electrode malfunction began. Hiranuma advises labs to maintain a daily graph of calibration and error events.

Good compliance for titration is a matter of managing risk, which Mettler Toledo (Columbus, OH) recognizes through a trademarked initiative, Good Titration Practice™ (GTP®). Metrohm USA has a similar initiative, Titration Boot Camp, to instruct end users on proper use and regulatory compliance for its titration product line.

GTP consists of five steps: evaluation of current and future analytical needs, instrument selection, installation, qualification, and operation. The company website provides a GTP "risk check" guide covering:

- Temperature fluctuation: A 5°> temperature change can affect volumes of non-aqueous titrants by 0.5 percent, while pH is also temperature-sensitive.
- Installation mode: Least desirable is self-installation; most desirable is vendor installation.
- Titration mode: The more automated the better, to reduce human error and free operator time.
- Documentation: Forget handwritten results. Consider a system that provides automated GLP-compliant printouts or, even better, that stores results in a compliant database.
- Training: GLP regulations do not specify training requirements. However, operators should be trained in titrator operation as they would be for any other instrument.
- Performance verification: Labs should calibrate periodically based on elapsed time or usage. Some systems lock when calibrations fall out of date or when titrants fall out of specification.

As Menegotto notes, some labs don't appreciate this level of intrusion, preferring simple automated reminders or acknowledgements that managers, one hopes, can act on. "If changes are made to certain protocols, the software should provide a login password that demonstrates the operator has the authority to make those changes, and include a field to include reasons for the change."

Angelo DePalma *is a freelance writer living in Newton, NJ. You can reach him at angelo@adepalma.com.*

FOR ADDITIONAL RESOURCES ON TITRATORS, INCLUDING USEFUL ARTICLES AND A LIST OF MANUFACTURERS, VISIT WWW.LABMANAGER.COM/TITRATORS

ARE YOU IN THE MARKET FOR A...
TOC ANALYZER?

Total Organic Carbon (TOC) analyzers are a mainstay of environmental and quality control chemistry. TOC, a crucial metric in many processes, may arise from a combination of living or dead organisms or chemical contamination. Its measurement can serve as a surrogate for more difficult measurements or a screen for further analysis.

Types of TOC analyzers used by survey respondents:

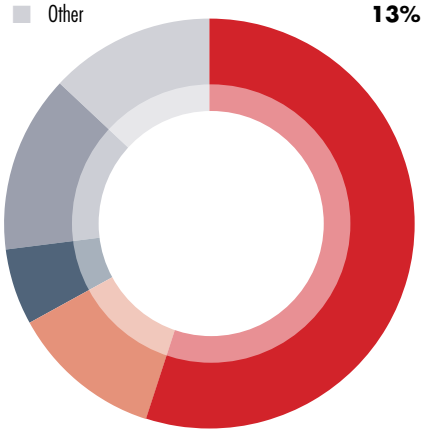
Benchtop	91%
Portable	14%
Online	7%

Methods used by survey respondents to detect CO_2:

Non-Dispersive Infrared (NDIR)	67%
Direct Conductometric (Non-Selective Conductometric)	11%
Membrane Conductometric Detection (Selective Conductometric)	21%
Other	4%

Nearly 47% of respondents are engaged in purchasing a new TOC analyzer. The reasons for these purchases are as follows:

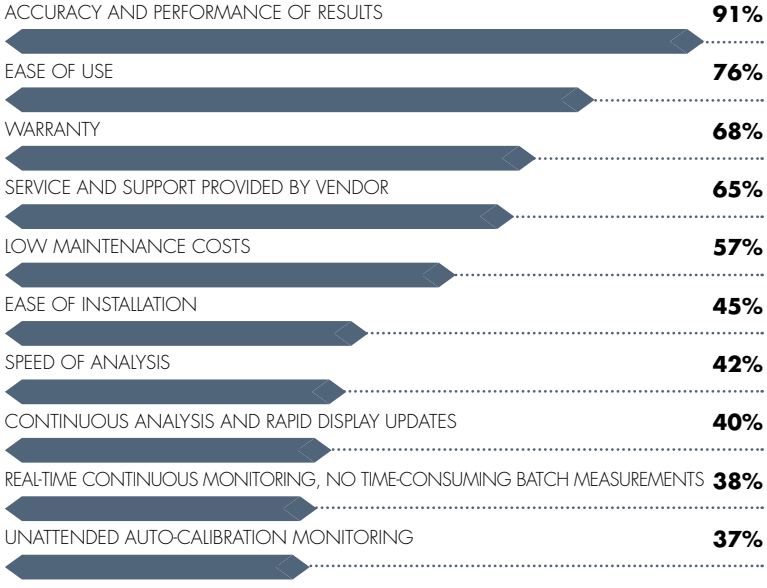
Replacement of an aging system	55%
Addition to existing systems, increase capacity	12%
Setting up a new lab	6%
First time purchase	14%
Other	13%



TOP 5 QUESTIONS
You Should Ask When Buying a TOC Analyzer

1. Is the TOC technology suitable for your specific application or water conditions? Many TOC technologies may be suitable only for waters with a narrow range of organic or inorganic contaminants.
2. Are different models available to meet your current and future sampling needs (i.e. online, portable, laboratory)? Do these models use similar technology to simplify method transfer or data comparability from lab to online?
3. Does the company offer the documentation and support necessary to help meet applicable industry or government regulations?
4. What is the company's level of experience supporting sales of TOC analyzers in your specific industry? Do they understand the unique challenges specific to your application?
5. What type of service, applications, and technical support are available during and after the purchasing process?

TOP 10 FEATURES/FACTORS
Respondents Look for When Purchasing a TOC Analyzer



For more information on TOC analyzers, including useful articles and a list of manufacturers, visit www.labmanager.com/TOC-analyzers

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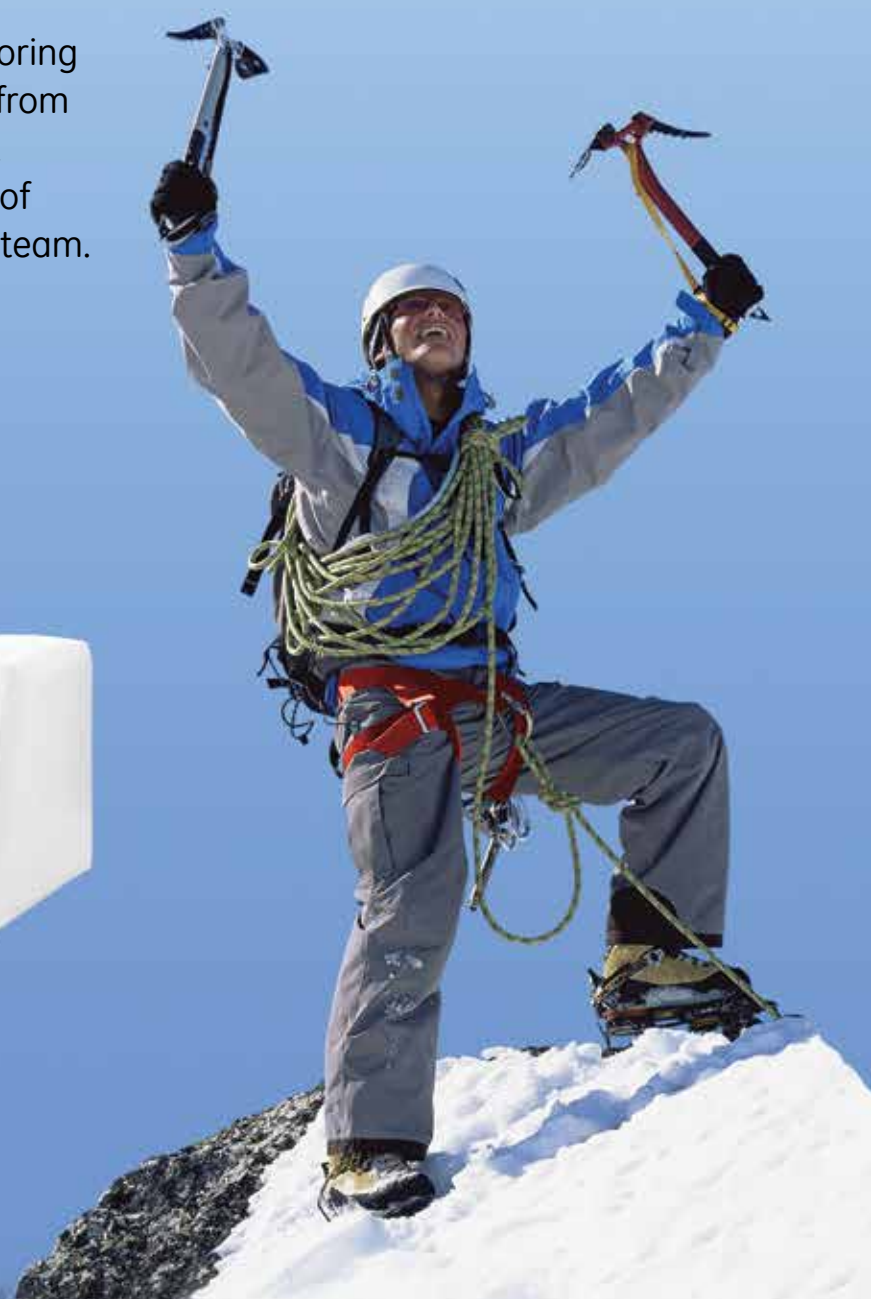

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Water & Process Technologies
Analytical Instruments

Dr. Nathaniel Hentz

ASK THE EXPERT

TRENDS IN LAB AUTOMATION

by Tanuja Koppal, PhD

Dr. Nathaniel Hentz is assistant director of the analytical lab at the Golden LEAF Biomanufacturing Training and Education Center (BTEC), where he develops bioanalytical assays in support of the various biomanufacturing processes taught at BTEC. Since 2008, Dr. Hentz has been responsible for developing and teaching undergraduate and graduate courses, industry short courses, and government (FDA and BARDA) training courses, with a focus on assay development and validation, quality control, and liquid-handling performance. Dr. Hentz also directs the contract analytical services program at BTEC. Prior to BTEC, he spent nearly 12 years developing high-throughput screening assays, automating and optimizing laboratory equipment, and investigating new technologies with Eli Lilly & Co. and Bristol-Myers Squibb. Dr. Hentz has also served as an independent consultant in the automated liquid-handling quality control, microfluidic separations, and ADME/tox fields. He received his PhD in analytical chemistry from the University of Kentucky in 1996, and his BS in chemistry from Eastern Michigan University in 1990.

Q: Can you provide some details on what your group is involved in?

A: Here at the Biomanufacturing Training and Education Center at North Carolina State University, I run the analytical group, and we provide support to our biomanufacturing operations, teach students, and also perform contract work. BTEC is a manufacturing facility, which was set up back in 2007, to train students for the biomanufacturing industry based here in Research Triangle Park. Our primary objective is to train students, and we teach them everything from cell culturing techniques to scaling up (to 300 L) using different types of bioreactors (disposable and stainless steel). We also teach them the downstream processes that include harvest, cell lysis, clarification, and purification, right up to bulk fill. My group supports everything on the analytical side, including in-process testing (concentration, purity, and safety) and protein characterization.

Q: The key question for most lab managers is, do I really need automation?

A: I have lived through that question, and it's really about managing the instrumentation usage. Most people use instruments, but nobody has a clue as to what the percent use is on those instruments. You first need to understand how frequently the instruments are being used, what they are being used for, and when they are being used. If processes are not automated, time is often wasted in the overnight hours or early in the morning when the instruments are sitting idle. Automation can be set up to run 24/7, but lab managers first need to understand where the inefficiencies are in their processes. If there are gaps in the process, then automation can come in to improve the efficiency, and this can be done by either partially or fully automating the process.

> "Automation can be set up to run 24/7, but lab managers first need to understand where the inefficiencies are in their processes."

Q: What if you already have automation in place but it needs to be replaced or upgraded?

A: If you already have automation and need to know if it should be replaced, then you have to do the right analysis to pick up the failure modes. What you do there is comb through all your log files, using some informatics tools to help. You monitor the data over time and find the mean time to failure. When the time gap starts to shorten and you have more frequent occurrences of instrument failure, that's a clue to look into the system. If the problem can be fixed, it's fine, but if you have to keep fixing frequently, then it's probably time to replace the automation.

Q: How do you decide whether to fully or partially automate your process?

A: I would say you should do what makes sense. You may not have the people or the workflow to justify 24/7 automation. You can pick an option, such as investing in a liquid handler that can meet your intermittent automation needs. The fully automated workstations [that] can be attached to different modules can be very expensive. Instead, you can automate a small portion of the workflow or use automation to replace a person doing repetitive tasks, such

as pipetting, to improve reliability at a much cheaper cost. This is something I call a stripped-down automation platform. This concept has been around for a couple of years now, and it certainly seems to add value to a screening group in academia and in small companies.

Q: What are some of the disadvantages that creep in due to automation?

A: One of the disadvantages is around reliability, because people try to make automation work for everything. Sometimes these systems are just not appropriate, and when you try to force a particular assay into an automation realm, you can get errors. Not that there is anything wrong with the design of the automation. It's just not right for the application. The second point is that people assume that automation guarantees a 24/7 operation and that you don't have to be physically present. They get into the mentality of pressing a button and walking away, and sometimes that leads to failures. Automation does need some sort of human contact. Another disadvantage is that with automation you do need a designated expert. If you need to be fully automated, you need to invest in an expert user, and that's something people are not prepared for. Some vendors are trying to address this issue, especially with the smaller systems, where new interfaces are easy to use and can be operated without knowing all the complex choices they offer. If you want to make the instrument readily accessible to most people, then work with the vendor to find the main parameters that need to be adjusted. Then your average user can pay attention to only these few parameters and get by 90 percent of the time.

Q: How easy is it to automate cell culture?

A: If you are working with cells as an assay platform, then I highly recommend that the cell culturing be automated, as it is so time-consuming. Automation works perfectly for cell culture, and there are easy ways to monitor if the cells are contaminated or not growing properly. With the new imaging systems you can look at multiple parameters in the cells, such as morphology changes, movement, and more, and it's relatively easy to do. A key to automating cell culture is to pay attention to potential routes of contamination.

> "When you try to force a particular assay into an automation realm, you can get errors."

Q: How should people go about evaluating the right vendor for their automation needs?

A: You first have to determine your need to see if you really need automation. If you do, then bring these systems in-house (if feasible) and try them out. People often make the mistake of buying the system first and then finding out that they don't like it or it cannot do what they want it to do. So map out how easy it is to use the system. Second, find out if it is appropriate for your use. People tend to get systems with all the bells and whistles, when they don't really need [them]. If you really don't need a Ferrari, it may make sense to get a Volkswagen.

Q: Do you look at other factors beyond the instrument and the robotics?

A: I look for a company that has a good record of customer service and ongoing support. Cost is certainly a factor when it comes to service, but the relationship with the vendor is very important to me. You may have a great team on-site, but you will still need to involve the service engineers from the vendor on various occasions. The vendor-customer relationship is important, so it pays to do your research. You also have to think about future growth in terms of integrating new equipment. When you are swapping out detectors or other pieces of equipment, they must be able to communicate using a software platform that is flexible.

Q: Is there anything new that is likely to change things in automation going forward?

A: I think there will be little improvements in automation, but frankly I don't see any quantum leaps, at least on the instrumentation front. In the past few years, the big changes have been more on the software and integration sides. If you have a fully automated system, then there are software packages that can help schedule tasks, minimize downtime, and maximize efficiency. I have seen software platforms that can monitor the log files from your entire system and map out the use and failure times to maximize efficiency. Unfortunately, most people don't even think about the efficiency gains that they can achieve with automation. The new trend is to monitor the automation system to understand what [it is] really doing and make the changes needed to get the efficiency gains. More changes are coming in the areas of informatics and communications in automation with the use of portable notepads and software that allow control of modular units remotely.

***Tanuja Koppal, PhD**, is a freelance science writer and consultant based in Randolph, New Jersey. She can be reached at tkoppal@gmail.com.*

INSIGHTS ON WATER TESTING LABORATORIES

INTERSECTION OF ENVIRONMENTAL, PUBLIC HEALTH, AND CONSUMER MARKETS

by Angelo DePalma, PhD

Water testing laboratories hold a unique position among analytical facilities in their interaction with broadly diverse government and private entities.

The Guadalupe-Blanco River Authority (GBRA) is a quasi-government organization covering all things water-related in a 10-county Texas district. In addition to testing, the authority's activities include engineering, hydroelectric power generation, and educational outreach. The authority's water testing laboratory, directed by Josephine Longoria, analyzes drinking water, wastewater, and industrial water taken from and released to standing water and rivers, as well as water from underground sources.

As part of the national Clean Rivers Program, the lab also helps maintain water quality and health for the Guadalupe and Blanco rivers. GBRA's customers include local water agencies and distributors, industrial companies, and individuals seeking advice on well water quality.

Longoria's lab is accredited by The NELAC Institute (TNI), which provides certification via the National Environmental Laboratory Accreditation Program. The regulatory tangles water labs encounter arise from the alphabet soup of authorities and regulations under which they work. For GBRA these include, but are not limited to, the Clean Water Act; the Resource Conservation and Recovery Act; the Safe Drinking Water Act; and the Comprehensive Environmental Response, Compensation, and Liability Act. Texas laboratories must also deal with the Texas Commission on Environmental Quality (TCEQ), the Texas Railroads Commission, and the Texas Clean Water Act.

"Achieving TNI accreditation is expensive and time-consuming," Longoria says. Her lab is audited every two years for quality practices. Only labs that test for customers outside their geographic domain require this qualification. "But labs should consider this level of accreditation so that test results are more trustworthy; the data is more defensible."

Longoria practices what she preaches: When workloads or analytes fall outside GBRA's capabilities, the samples are outsourced, but only to TNI-accredited facilities.

TESTING AND SAMPLING

Most water laboratories run what are referred to as conventional tests. For wastewater, these include biological oxygen demand, carbonaceous biological oxygen demand, total suspended solids, and others. Drinking water assays focus on microbiology; for example, total coliform analysis, fecal coliform, and E. coli. Nutrients are quantified in rivers and other potential drinking water sources. The most common are nitrates, ammonia, total phosphorus, and total organic carbon. Chlorinated water undergoes evaluation for chlorinated hydrocarbons, including tetrahalomethanes, as well as pH and residual chlorine. Pre- and post-industrial water undergo a variety of tests based on previous use or future intended use. GBRA also determines that industrial users have the proper disposal permits.

Water is as diverse as any other substance. Test goals, customers, analytes, and matrices differ widely among samples from lakes and rivers meant for drinking or recreation, water treated at municipal drinking water plants, or samples arising from municipal waste or industrial processes. Matrices can differ based on geography or proximity to industries. Hydraulic fracking, for example, has raised numerous water quality issues that were unknown a decade ago. Analytes and matrix dictate instrumentation and testing protocols. Adding a layer of regulation compounds the complexity. "You can get into the legal world very quickly," Longoria says.

Many problems in water labs originate at the sampling site. "If you don't sample correctly, it doesn't matter what the lab does," Longoria says. "Sometimes we have to train our customers on proper sampling by providing guidance, cheat sheets, and instructions on obtaining samples that best represent the site of interest."

Some samples require preparation to remove interferences or to prolong hold times. Analyzing beyond hold-time windows automatically flags data as "qualified" or "inadmissible."

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Ingeniously Practical

1. Pipetting samples and standards at the Guadalupe-Blanco River Authority Regional Laboratory. **2.** Microbiological assays are a significant part of river health analysis at the Guadalupe-Blanco River Authority Regional Laboratory. **3.** Technician Justin Turner performs biological oxygen demand analysis at Guadalupe-Blanco River Authority Regional Laboratory.

"Hold time is huge, especially when your instrumentation decides not to work that day," Longoria says. She advises lab managers to always have a "Plan B" in place in the event of instrument or system failure, unwieldy workflows, hold-time deadlines, or the absence of certain instrument operators.

Related advice applies to instrumentation. Outside of LC-MS, water labs do not use many exotic analyzers. Ion and nutrient analyzers tend to be robust, but they have their limits in terms of stretching maintenance schedules. "You know your analyzers have been running hard for four months straight and probably need to be shut down for preventive maintenance," Longoria says. "Don't wait for them to break down. Assign regular maintenance times throughout the year. Otherwise your instrument will go down at the worst time, when you've just received a big load of samples."

AUTOMATING SAMPLE HANDLING

Longoria strives to keep her staff of 12 abreast of the many regulatory agencies they deal with, each with a unique preferred reporting format. "A Clean Rivers Program sample must follow the quality assurance project plan for that entity. If you're working on samples for a nearby city, we must follow the TCEQ rules and the EPA's 40 CFR Part 136," Longoria says.

She could not keep up with all these demands without a LIMS, she adds. GBRA has recently upgraded its LIMS. As of January 1, 2015, the lab's information management system will be based on a product from ATL.

Customers, particularly states and municipalities, often change their report forms, but a lab's LIMS may lack the ability to generate custom forms. Form generation is a feature lab managers need to think about when purchasing a LIMS for a water lab. Falling back on paper forms erases a good deal of the benefit of automated lab information systems.

As interviews with this month's two laboratory managers show, a LIMS is invaluable even in small labs. "One of a LIMS' main benefits is avoidance of human error," says Ken Rosnack, business development manager for food and environmental at Waters (Milford, MA). "If you have to read an instrument value, copy it to a piece of paper, transcribe it to a paper notebook, and then transfer it into a data system, opportunities for transposing

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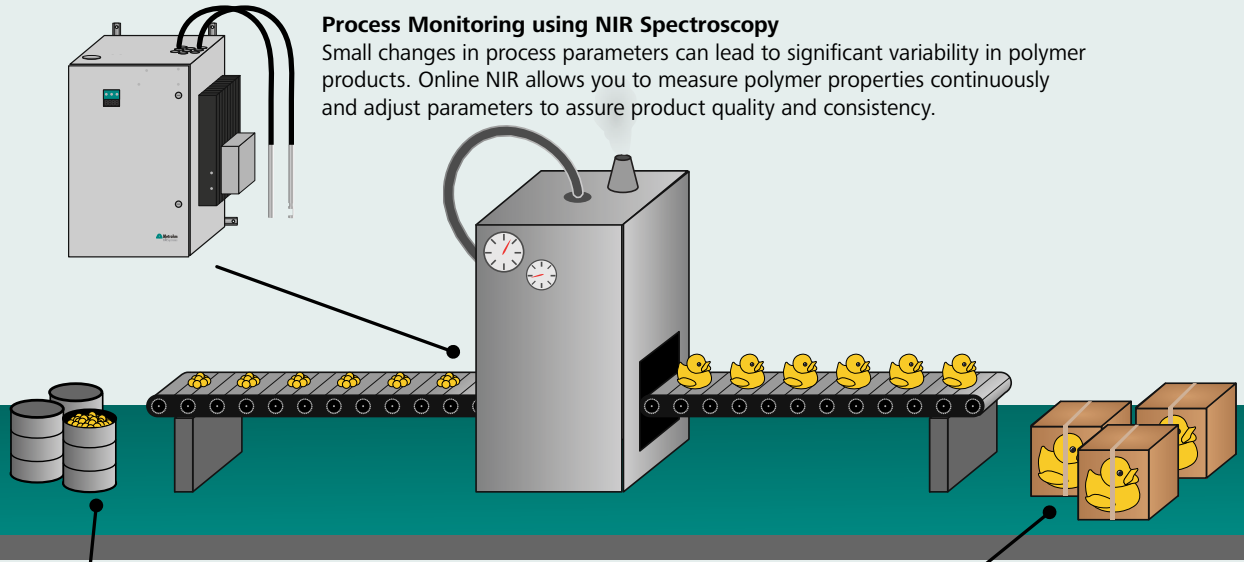

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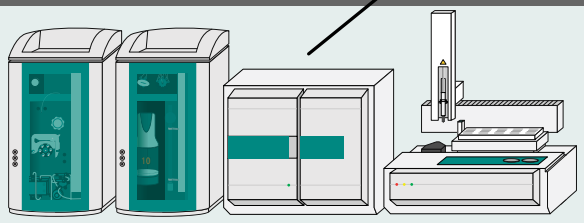

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numbers abound." Data volume also contributes entry points for erroneous readings and transcriptions.

Water testing laboratories rely on many individual tests that change over time through regulatory decree or with customers' evolving needs. New instruments replace old, technicians and scientists come and go, SOPs undergo revision, and established methods fall by the wayside.

For example, many labs now test for pharmaceuticals in drinking water. "Methods and instrumentation from 20 years ago would never pick up those compounds," Rosnack says, "but they nevertheless are known to pose long-term health risks." A lab seeking to expand into organics/pharmaceutical testing would need to implement those protocols rapidly, store them as methods, and guide sample processing through a LIMS or its close cousin, a laboratory execution system.

"Anywhere a LIMS takes a reading–from a balance or pH meter all the way up to a mass spectrometer–any time it stores information securely, that's a benefit," Rosnack says. He also suggests that data be stored on an offsite server for security reasons, in case of a lab disaster.

A LIMS provides value beyond the testing laboratory. Many government labs now instruct remote technicians on proper sampling techniques. If these individuals had remote access to the laboratory's LIMS, they could log and barcode samples as they collect them, Rosnack notes. Samples would arrive at the lab fully documented and ready for testing. "The closer to the starting point a LIMS is accessed, the better."

A LIMS also tracks changes to existing methods and newly approved or mandated analyses, who made the change, and why. Tracking those changes and the rationale behind them is critical to regulatory compliance and meeting individual customer requirements.

HUMAN RESOURCE CHALLENGES

The City of Everett Water Lab (CoEWL) (Everett, WA) began as a wastewater testing laboratory, then expanded into analysis of drinking water and solid waste samples. Water quality analyst and manager Chris Merwede's group tests for nutrients, metals, microbes, biological oxygen demand, and total suspended solids, and utilizes other wet chemistry methods.

Merwede's main hurdles relate to his lab's size–five analysts including himself. Workflow bandwidth issues cause the lab to outsource organics testing and to jockey test schedules to accommodate on-hand expertise.

Short-hold tests challenge all analytical labs, but with some staff working four 10-hour shifts and others a more traditional schedule, CoEWL is forced to consider not just analytic capabilities, but coordinating sample arrival with the appropriate expertise. For example, one analyst specializes in metals, another in nutrients, while a third conducts microbiology tests.

Since bacteria may multiply or die in a very short time, the lab runs microbial tests within six hours of receiving them. Nitrites have an outside hold time of 48 hours. Dissolved metals fall somewhere in between. Samples tested for metals must be filtered on arrival to prevent metals leaching from suspended particles. After that, samples are stable.

"If someone is working four 10-hour shifts and they're off on a day when a bacteria test sample comes in, what do you do?" Merwede asks. Regular customers usually call ahead to ensure that the correct analyst will be on the job when they deliver samples.

CoEWL maintains a vigorous cross-training program that stretches its available skill set at any particular time, but its coverage is imperfect. "You need experience with an instrument to understand its capabilities and the quirks associated with particular samples," Merwede says. "If no one is available to test a sample, we're forced to subcontract it out."

CoEWL is accredited with Washington for drinking water

and wastewater through the state's Department of Ecology and Health, which luckily for the lab consists of two separate entities that have merged. Before the agencies joined forces, both audited CoEWL. Now the lab undergoes just one combined audit every two years.

With little leeway in terms of human resources, and with its manager wearing several hats, the lab relies on PerkinElmer's LABWORKS LIMS to keep track of samples and tests. The package includes a general data report form covering what most customers need. Those requiring a specific format benefit from SAP's Crystal Reports, which is incorporated into CoEWL's LIMS.

Even with a LIMS, the paperwork, regulatory, and operational burdens on small water laboratories are daunting. "The many roles I must play as manager is my greatest challenge," Merwede tells *Lab Manager*. "A lab of our size can't afford to hire someone just to complete the reams of paperwork."

While automating sample flow and assays through its LIMS certainly helps CoEWL, particularly with reporting and compliance, many assays still run in manual mode. Safety checks and occupational health-related compliance still require surveying the lab, notebook in hand, on foot. Similarly, preparing for state audits does not lend itself to automation.

Workflows do not slow when the microbiology expert is filing validation documents or the metals specialist is dealing with a troublesome customer. Managers of small labs must juggle several occupations, approaching the expert level in some instances.

Merwede is CoEWL's de facto safety officer. As a trained chemist he is familiar with safe operation of fume hoods, but balancing the air demands of hoods plus the lab's HVAC system required him to dig deeply into facility and engineering lore–a task he would not have to worry about at a much larger organization.

"It's the things you don't know about lab safety that can get you, the unknown unknowns," he says. "Suddenly I have to be an HVAC person. 'Jack-of-all-trades, master of none' doesn't apply here. In a small lab, the manager must be a jack-of-all-trades and master of many."

Angelo DePalma *is a freelance writer living in Newton, NJ. You can reach him at angelo@adepalma.com.*

BIOLOGICAL SAFETY CABINETS

THE CABINET AND PERSONNEL MUST WORK TOGETHER

by Mike May, PhD

When working with a biological safety cabinet (BSC), safety comes first. Nonetheless, it's easy to make mistakes that can compromise a BSC's performance. "One of the most common mistakes while working in the cabinet is to cover the front grill, where the air enters," says Mary Ann Sondrini, executive director at the Eagleson Institute (Sanford, ME). "That disrupts the airflow, compromising both personnel and product protection." It might seem convenient to set something—like a rack of test tubes—over the grill, but it's definitely not safe.

In addition, a scientist needs to be aware of the movements that he or she makes in and around a BSC. For example, Sondrini says that you should move your arms in and out of the cabinet slowly. At NuAire (Plymouth, MN), marketing director John D. Peters agrees. He says, "Arm movements will disrupt unidirectional laminar airflow within the work zone and the air barrier at the front of the cabinet." That starts a chain reaction of problems. As Peters says, "This disruption could cause air turbulence, increasing the odds of product cross contamination within the work zone." In general, keeping down the turbulence inside a BSC improves safety inside and out. For example, Peters says, it "prevents the unwanted spread of aerosols or splatter of liquids."

Also, be sure to take a look inside your BSC to see whether you are making any mistakes there. For instance, Sondrini says that people commonly clutter the inside of the cabinets with things that they don't need. Even worse, she sees people putting Bunsen burners inside. "This causes big problems," she says. "It generates so much heat that it completely disrupts the airflow. Also, Bunsen burners in cabinets have led to many explosions."

To use a BSC safely, says Sondrini, a scientist must think about how it works. "Once you understand the airflows and how fragile the filters are, you learn what to *not* do," she says. To help show scientists the way a BSC works, Sondrini's team uses smoke and particle counters in the safety classes, which her company has been teaching for more than 25 years.

Prepare a plan

To ensure using a BSC in the safest way, you need a plan. "Make sure that you have an entire plan of how you will get in and out of the BSC," says Deborah Thibodeaux, science director at The Baker Company (Sanford, ME).

That plan must include how you handle items that you will use. For example, Thibodeaux says, "I've seen people—I see this constantly—open pipettes outside the cabinet before using them inside the cabinet. It introduces anything contaminated outside the cabinet into it."

The plan, she says, should include wearing gloves. "Many scientists think the cabinet is clean, so they don't need gloves." But gloves should be worn, and they must be sterile. "Spray the gloves with 70 percent ethanol or bleach," Thibodeaux says. "That way the gloves don't contaminate the cabinet with something from the outside."

Beyond cleaning your gloves, Thibodeaux also reminds scientists to clean the BSC's surface. "That means using a cleaner approved for your lab or 70 percent ethanol; soak the surfaces and let it go a minute, or five minutes if you can," she says. Then you can wipe it dry, but let the cabinet run a few more minutes to resettle the airflow.

The plan should also include what to do if something goes wrong. Imagine that a BSC indicator shows that a filter is no longer working properly. What do you do? Peters says, "In this scenario, work will need to stop, the window sash should be closed, turn the power off, place a note stating that the cabinet is out of order, and place a call to your service provider." This might be the most important part of a plan.

Up to speed

In general, keeping a BSC running keeps it safer but can consume more energy. Some BSCs come with a night mode, though, in which the viewing screen can be closed, the lights are shut off, and the airflow is reduced.

The longer a BSC runs the more impact on the filter, which gets loaded over time. Some BSCs have a magnehelic gauge that gives a general idea of how much filter loading has taken place. As a filter loads with particulates, some BSCs automatically adjust the fan speed as needed to ensure adequate airflow for safety.

Knowing when a BSC last received service also impacts its safety. "There needs to be clear communication on maintenance," says Thibodeaux. Only then can all of the users be sure that they are working with a safe device.

Nonetheless, even different organizations recommend different maintenance cycles. For example, Peters says, "NSF recommends to certify your cabinet annually, while USP 797 recommends twice a year." In a certification, says Peters, "your cabinet will be finely tuned to maximize safety through airflows." He adds, "Your certifier can also recommend when it might be time to replace your BSC or if it's in need of parts."

If a BSC does need repairs, it could go beyond adjusting the airflow or replacing filters. Some BSCs also include audible and visual alarms. These need to be kept in working order too.

In some cases, the result of a certification or repair will be that a BSC cannot meet the necessary airflows. This is bad news, but it must be heard to keep a lab and its personnel safe. As Peters says, "If a cabinet is unable to meet specified downflow and inflow air, it usually means it's time for new supply and exhaust HEPA filters." He adds, "Cabinets in the field today will either have a manual process or an automated alarm to notify users if airflow is not within safety set points."

At some point, staying safe means replacing an old BSC with a new one. In a lab that keeps the personnel properly trained and the BSCs properly certified, though, everyone can be safe for a long time.

Mike May *is a freelance writer and editor living in Ohio. You may reach him at mike@techtyper.com.*

FOR ADDITIONAL RESOURCES ON BIOLOGICAL SAFETY CABINETS, INCLUDING USEFUL ARTICLES AND A LIST OF MANUFACTURERS, VISIT WWW.LABMANAGER.COM/BSCS

ARE YOU IN THE MARKET FOR A... CO_2 INCUBATOR?

CO_2 incubators are designed to copy a cell's natural environment with a relative humidity of around 95 percent, a temperature of 37°C and a pH of 7.2 to 7.5. They are most common in biology labs performing tissue or cell culture and are used in any process where cells need to be cultured for a few hours or many weeks or where cells need to be expanded or maintained.

Types of CO_2 incubators used by survey respondents:

Water Jacketed	60%
Air Jacketed	36%
Direct Heat	21%
Gel Jacketed	1%
Other	1%

Primary purpose of CO_2 incubators as reported by survey respondents:

Research	77%
Clinical	18%
Quality Control	4%
In Vitro Fertilization (IVF)	2%
Other	5%

Nearly 57% of respondents are engaged in purchasing a new CO_2 incubator. The reasons for these purchases are as follows:

Replacement of an aging system	32%
Addition to existing systems, increase capacity	22%
Upgrading existing equipment	18%
Setting up a new lab	10%
First time purchase	6%
Other	12%

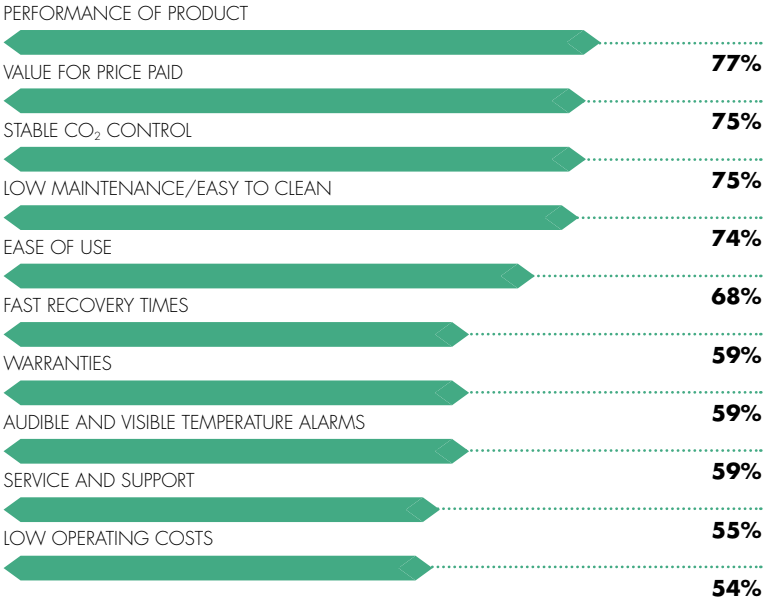
TOP 6 QUESTIONS

You Should Ask When Buying a CO_2 Incubator

1. What measures have been taken in the design to avoid contamination and what features are included to remove contamination?
2. How does the CO_2 sensor contribute to optimal cell growth?
3. How does the humidity contribute to optimal cell growth?
4. Ask for the uniformity and accuracy data versus asking for a water jacket or air jacket.
5. Do you need O_2 control to simulate the environment for your experiment accurately?
6. Calculate the total cost of ownership on the product over one year including product price, install, regular cleaning labor, material like HEPA filters, etc.

TOP 10 FEATURES/FACTORS

Respondents Look for When Purchasing a CO_2 Incubator



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BATHS AND CHILLERS

ALL ROADS LEAD TO EFFICIENCY

by Angelo DePalma, PhD

With chillers, the solution is the same for achieving temperature control, cost-effective cooling protocols, energy savings, and long operating life: mechanical and operational efficiency.

> "Chiller location can also affect the efficiencies of both the chiller and the cooling process."

Cost-effectiveness comes down to cost of ownership, which involves balancing space, time, and energy consumption. "Laboratory space is at a premium. It costs money," says Bob Given, director of product management, temperature control at Thermo Fisher Scientific (Newington, NH). Given recommends recirculating chillers or bath circulators with small footprints for a given power rating, which many of today's best-in-class devices provide.

"Time is at a premium, and it also costs money," Given adds. Premium bath circulators feature a degree of programmability, so users leave their location to adjust or turn the device on or off. Related is remote control from a tablet, phone, or computer. Lab managers should consider units controlled via Bluetooth rather than through a conventional wireless or Ethernet network. "Because Bluetooth operates at short range, you don't need your IT department involved at all."

Remote apps should provide full functionality (including temperature programming), monitoring, alerting when temperatures fall out of spec, and multi-cooler capability. "The idea is to catch issues before they become problems," Given says.

Cost of ownership extends to maintaining industry-appropriate records, because audits and violations, as Given might say, cost money. Highly regulated industries or businesses should record and maintain records in a form that cannot be doctored.

Speed versus cost

Another aspect of time savings involves the trade-off between speed on one hand and energy consumption and acquisition cost on the other. Speed means the time it takes to reach a particular temperature, which becomes a factor when chillers are shared. Given advises managers to consider a more powerful chiller or bath circulator with shorter time to temperature, despite the higher price tag and energy consumption. "Again, cost of ownership involves trade-offs. Nothing comes for free," he says.

One trick for shortening time to temperature for a bath circulator involves displacing some of the fluid with a displacement block. Less fluid in the bath requires less energy to heat and cool and therefore shortens the time to temperature.

Energy-saving modes can offset energy required for rapid temperature ramping as well. Traditional recirculating chillers and bath circulators operate at full cooling all the time. Temperatures are maintained by heating the fluid against the cooling gradient. Problem: the heater consumes more energy than does the cooling mechanism. In energy-saving mode, cooling ramps down after reaching the set temperature, so less cooling—and more important, less heating—is required to maintain temperature, resulting in less energy used during steady-state temperature soaks.

Factors to consider

When selecting a chiller, one must strike a balance between meeting the minimum

performance specifications and allowing for increased cooling demand. "An undersized chiller will run constantly at maximum capacity without necessarily meeting a lab's cooling needs," explains Kelly Gibbons, marketing specialist at PolyScience (Niles, IL). Conversely, a significantly oversized chiller will consume more energy than will a properly sized chiller by cycling component power on and off much more frequently. "This short runtime of components can also greatly shorten the product's lifespan."

Chiller location can also affect the efficiencies of both the chiller and the cooling process. Air-cooled chillers require unhindered airflow through the condenser and proper ventilation for warm air exhaust. Inadequate space around the chiller or poor room ventilation combined with a dirty condenser can lead to less than optimal performance and, in a worst case, can damage the chiller and the process due to inadequate cooling.

"Inside your chiller, powerful pumps, compressors, valves, and fans are all functioning together to keep your process at the proper temperature," Gibbons says. "All those moving parts can make considerable noise, which can adversely affect nearby workers. To counteract this effect, she suggests acquiring a chiller with environmentally friendly features that reduce noise through efficient operation. According to PolyScience, its patented WhisperCool® Environmental Management System, for example, employs adaptive technology to reduce operating noise to levels below those of conversational speech while improving performance, reducing energy consumption, and prolonging equipment life.

Angelo DePalma *is a freelance writer living in Newton, NJ. You can reach him at angelo@adepalma.com.*

FOR ADDITIONAL RESOURCES ON BATHS AND CHILLERS, INCLUDING USEFUL ARTICLES AND A LIST OF MANUFACTURERS, VISIT WWW.LABMANAGER.COM/BATHS-CHILLERS

FOR ADDITIONAL RESOURCES ON NITROGEN EVAPORATORS, INCLUDING USEFUL ARTICLES AND A LIST OF MANUFACTURERS, VISIT WWW.LABMANAGER.COM/EVAPORATORS

NITROGEN EVAPORATORS

MAKING SAMPLE CONCENTRATION EASIER AND GREENER

by Mike May, PhD

When a scientist needs to concentrate a sample that's in a volatile liquid—like acetone, acetonitrile, or methanol—a nitrogen evaporator can do the job. As a result, scientists use this technology in sample preparation in environmental, polymer science, quality control, and toxicology labs, plus others. Kelly Williams, product manager for nitrogen evaporators at Labconco (Kansas City, MO), says that nitrogen evaporators are typically used "to concentrate samples before analysis or to concentrate samples before a solvent exchange."

How a scientist uses a nitrogen evaporator depends largely on the industry, says David Oliva, sales and marketing manager at Organomation (Berlin, MA). "For example," he says, "our environmental laboratory customers might mainly use our equipment while conducting the 500-level EPA methods."

At Pharmacore (High Point, NC), senior director of GMP analytical chemistry Mark Shapiro says, "We use this technology to evaporate large quantities of solvent to do cleaning verifications." As a company that provides chemistry services—from custom organic synthesis to manufacturing of controlled substances—Shapiro and his team need efficient processes and instruments.

Tweaking the technology

A variety of changes keep improving nitrogen evaporators. As an example, Williams points out "advancements that have made nitrogen blowdown evaporation more convenient." These include the addition of a dry block heater instead of a water bath. The latter, says Williams, "requires maintenance and generates condensation, leading to cross contamination." In addition, she says that endpoint determination comes in handy with samples that cannot go to dryness but need to be concentrated to a specific volume for analysis. Williams says, "This frees end users up so they do not have to babysit their samples." Last, she adds that mechanical vortex motion or placing samples at an angle to create vortexing action in the sample increases the rate of evaporation by increasing the surface area.

Other advances in the technology also benefit many scientists. Oliva says, "In my opinion, the most interesting advance in laboratory evaporation as a whole is the ability to recapture solvent in an efficient manner." In part, state and federal regulations drive this advance, because today's laboratories must be more environmentally friendly. As an example, Oliva says that Organomation makes solvent evaporators "capable of up to 97 percent solvent recovery." He adds that these evaporators "for round-bottom flasks can be purchased with a nitrogen manifold option, which aids evaporations that will be going to dryness."

For nitrogen evaporators specifically, Oliva sees flexibility as the biggest advance. He says, "While some products in the laboratory space are increasingly specialized for a specific application, customers demand that nitrogen evaporators can be utilized in a broad range of applications." For example, some scientists want a device that works with different sample holders, such as vials or 96-well plates. That is available in existing devices.

For Pharmacore's needs, Shapiro says that his existing nitrogen evaporator "does everything we need. It has variable speeds and temperatures." If he could get an improvement, he'd like a valve on the nitrogen delivery line that slowly actuates once the lid is closed—instead of being completely open right away. For now, he and his colleagues just close the lid on the evaporator and slowly turn on the nitrogen by hand.

The breadth of use for nitrogen evaporators means that the devices must work in different conditions. That can require variations in the technology. For instance, Oliva says, "If the nitrogen evaporator is being used with harsh solvents, I would extremely recommend a unit with acid-resistant coatings." The right features and a little TLC can keep a nitrogen evaporator working for years.

Mike May is a freelance writer and editor living in Ohio. You may reach him at mike@techtyper.com.

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KEYNOTE SPEAKER – **Rebecca Pfundheller**, president/CEO Analytical Food Laboratories (Grand Prairie, Texas) who, in 1992 started her own food testing lab, will share her knowledge and experience of running a lab like a business.

INFORMATICS IN FOOD LABS – MANAGING DATA AND MEETING REGULATORY COMPLIANCE CHALLENGES – **Colin Thurston**, project director, informatics business, Thermo Fisher Scientific, explains how today's informatics can provide the data and traceability that enables food producers to maintain safe processes and ensure quality control for their products, and respond to regulatory authorities with acceptable reporting documentation.

THE ROLE OF ANALYTICAL TESTING IN MAINTAINING FOOD SAFETY – **Dr. Katerina Mastovska**, associate scientific director, Nutritional Chemistry and Food Safety, Covance Laboratories, discusses a host of analytical methods that result in higher sensitivity for difficult-to-detect contaminants, detection of contaminants in new matrix classes, and faster turnaround times for results.

FOOD FRAUD / FORENSICS – **Dr. Robert Hanner**, University of Guelph, Centre for Biodiversity Genomics, discusses new methodologies employing DNA testing and genetic bar coding to crack down on food fraud.

GMO TESTING OF FINISHED PRODUCTS AND INGREDIENTS – **Dr. Heather Secrist**, CEO, Global Operations, Genetic ID, discusses the latest testing technologies used for GMO identification and quantification.

ARE YOU IN THE MARKET FOR AN... ELECTRONIC LAB NOTEBOOK?

Electronic laboratory notebooks (ELNs), one component of a lab's information infrastructure, help laboratories capture and manage knowledge, streamline data management, protect intellectual property and foster collaboration. Both non-specific/generic ELNs (which compete directly against paper notebooks) and application/task-specific ELNs exist, each with their own fans.

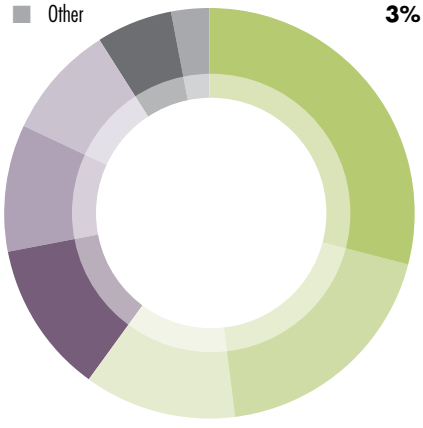
Types of ELN installation used by survey respondents:

Client/server	41%
Web-based	31%
Stand-alone	23%
Thin client/server	0%
Other	5%

Primary purpose for ELNs as reported by survey respondents:

Centralized data repositories	61%
Accelerating the documentation and reporting of experimentation	45%
Infrastructure for capturing, accessing and sharing experimental information	42%
Improve productivity	42%
Enabling scientists to collaborate effectively on multi-stage projects	32%
Intellectual property (IP) protection	21%
Improved communication between instruments and related software	13%
Workflow coordination across geographic and business boundaries	13%
Streamlined regulatory compliance	11%
Patent evidence creation	11%
Other	8%

Nearly 24% of respondents are engaged in purchasing a new ELN. The greatest challenges faced in the process include:



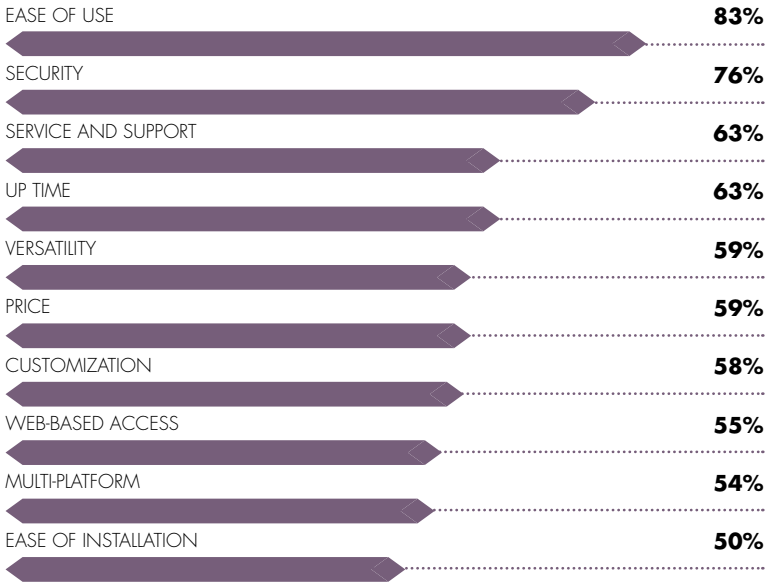
TOP 6 QUESTIONS

You Should Ask When Buying an Electronic Lab Notebook

1. How local are resources and how available are resources for deployment, training and extensions? What is the timeline for availability and cost?
2. How easy is it to extend the application? Does it require IT or super users? How long does training take to make modifications and how extensive is the API for modifications?
3. How easy is it to get data back out of the system? Is all information indexed and searchable? Can users query and combine data from multiple experiments, not just return a list of experiments?
4. What is the typical number of hours of admin time required to upgrade for a major release and a minor release?
5. What level of support is offered? How many support staff are there, where are they located and what language do they support? How is the support rated by other customers?
6. Is your IP system safe in their system? What is the chance the company will be around in five years? What is the chance that the company will switch technologies and force an expensive migration? What credibility does the company have in the past for delivering robust, scalable, secure, and 21 CFR Part 11 compliant systems?

TOP 10 FEATURES/FACTORS

Respondents Look for When Purchasing an Electronic Lab Notebook



For more information on electronic lab notebooks, including useful articles and a list of manufacturers, visit www.labmanager.com/ELN

SCRUBAIR PIPETTE WASHER/DRYER

Water conservation has become a topic of interest in modern lab design. And in keeping up with current market needs, Labconco researched lab water usage and discovered one major sink hole — glass pipette washing.

Gallons upon gallons of tap water are poured down the drain as the common, siphon-style, pipette washers fill then drain repeatedly. When washing is complete, rinsing generally begins using deionized (DI) water – a very expensive solvent. After the time-consuming process of washing and rinsing, the pipettes must be carefully removed, sorted into drying baskets and placed in an oven overnight. Total elapsed time to wash and dry a single load of pipettes — more than 24 hours.

Tapping into our experience of designing and manufacturing laboratory glassware washers, we decided to address this issue. Combining direct injection cleaning, scrubbing action of percolation and consistency of automation, we streamlined the washing process with considerably less water and substantially less time.

The new ScrubAir™ Pipette Washer/Dryer is a one-of-a-kind automated unit to wash and dry in one place. The durable, steel-constructed unit can wash, rinse and dry up to 60 pipettes with just the touch of a button. And it reduces water usage to as little as 12.5 for wash and rinse versus the 600L (at 2L/min) easily required for four hours of manual washing. At the completion of the wash and rinse cycles, forced-air drying is initiated through direct injection. Total elapsed time to wash and dry a load of pipets with the ScrubAir — just under five hours. This drops to 3.5 hours with the heated model.

The user-friendly interface has three flexible and lockable program cycles including options for both wash and dry duration and number of rinse cycles. The standard model is equipped with a single water inlet and pressurized air inlet. The heated model has an additional water inlet built in, giving the user the added ability to rinse with purified water.

A previously labor-intensive, time-consuming and overall environmentally unfriendly process has been transformed into a fast, simple, environmentally friendly one. Users no longer need to babysit their pipettes. Press a button, walk away, and let the ScrubAir do the work.

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816.822.3749

ARE YOU IN THE MARKET FOR A... WATER PURIFICATION SYSTEM?

Water is the most commonly used laboratory reagent; however, the importance of water quality is often overlooked. Because impurities can be a critical factor in many research experiments, water purity ranks high in importance. There are several types of impurities and contaminants in water such as particulates, organics, inorganics, microorganisms and pyrogens that can adversely affect results.

Achieving water of a high quality requires the careful use of purification technologies and a method for accurately measuring and monitoring contaminants.

ASTM standard water purity used by survey respondents:

ASTM Type I	59%
ASTM Type II	30%
ASTM Type III	8%
Other	9%

Water purification system components used by survey respondents:

Water quality monitor	64%
Storage tank	62%
Dispensing points	60%
UV sterilizer	47%
Polisher	43%
Distiller	22%
Water softener	21%
Other	5%

Nearly 52% of respondents are engaged in purchasing a new water purification system. The reasons for these purchases are as follows:

Replacement of an aging system	36%
Addition to existing systems, increase capacity	12%
Upgrading existing equipment	28%
Setting up a new lab	8%
First time purchase	4%
Other	12%

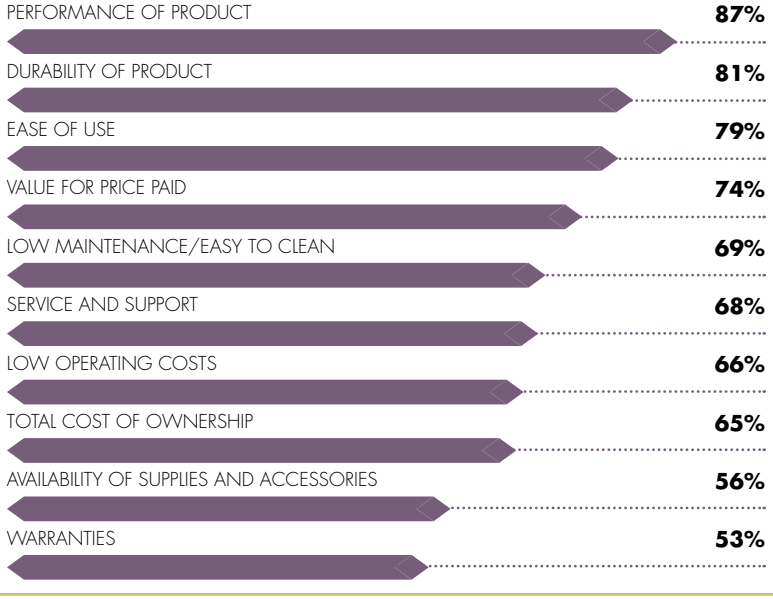
TOP 4 QUESTIONS

You Should Ask When Buying a Water Purification System

1. What do you need the water for? What is your application and what type of water is needed? What is the source of your current water? How much water is required per batch/day? Are there special requirements for delivery?
2. What is your budget? (This will determine the technology). What is the cost of ownership over five years?
3. Where do you need the system in the lab(s)? Consider: top of counter, under counter or wall mounting the unit. What is the overall footprint/real estate of the system(s) and components?
4. What kind of warranty and service is provided? Is the system manufactured to quality standards and which ones? Is this a pharmaceutical application that needs to be validated?

TOP 10 FEATURES/FACTORS

Respondents Look for When Purchasing a Water Purification System



For more information on water purification systems, including useful articles and a list of manufacturers, visit www.labmanager.com/water-purification

Thermo SCIENTIFIC

A Thermo Fisher Scientific Brand

smart H_2O for you,

Pure water is elemental to the success of your experiments. But finding the right water system for your research goes deeper than water quality alone. You need a **smart choice that supports both your science and your budget**—not only on day 1, but with every cartridge and filter change. One that reflects 130 years of innovations, like feed water monitoring, hands-free dispensing and effortless cartridge change-outs. With a Thermo Scientific Barnstead lab water system, the only thing you'll have in your water is confidence.

and your science

• learn more at **thermoscientific.com/labwater**

Protect valuable experiments and consumables with integrated feed water monitoring.

Set your desired volume for hands-free, automatic dispensing.

Easily replace consumables with quick-connect cartridges.

PRESSURE-BASED MICROPLATE VOLUME MEASUREMENT

Problem: In virtually all research processes in which analytes and reagents are mixed in microplates, precise information on the starting volume in each plate well is critical to the accuracy and success of the process, as well as the results derived from it. While effective tools for measuring the dispensing of liquid volumes by pipettes have been available for years, accurate volume measurement of what is actually in the plate at a given time has been a challenge. Scenarios where this presents a roadblock include compound library management, compound dilution and plate replication, and high-throughput screening. In applications where samples have been stored for periods of time, environmental factors and process errors may affect the plate volume, and it is not uncommon to find that a storage plate contains less volume than expected.

Solution: The new Artel VMS™ directly measures the actual volume of liquid or solid contents in each well of 96- or 384-well microplates using pressure in a confined microplate well measured by eight highly precise and accurate pressure sensors. By sealing and pressurizing individual microplate wells and pumping in a known amount of air, the VMS determines the volume of the contents regardless of the shape, material, or color of the well.

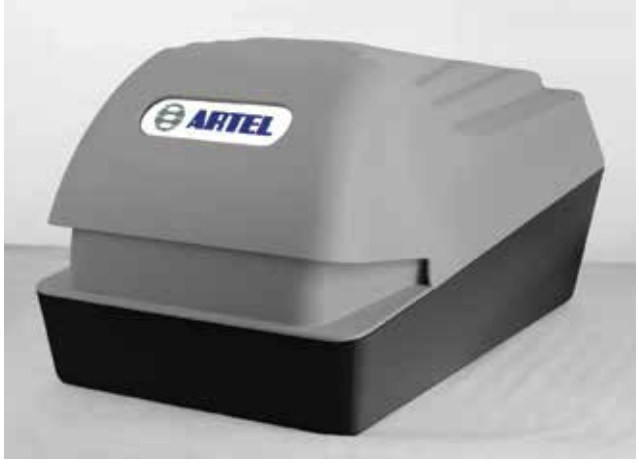
Users calibrate the system by measuring the pressure in each of the empty wells of their chosen plate type, followed by measuring those same wells filled with precision metallic cylinders of known volumes. The VMS software performs a linear interpolation on the set of data points, producing a series of eight linear curves used to calibrate each pressure sensor. Sample volumes are then determined using pressure measurements from the test wells and the corresponding curve for that sensor. The technology is applicable to solid samples in addition to all types of liquids.

The pressure-based volume determination method requires minimal setup, no consumables, and can be integrated into existing automation processes. It can be used at any point in the experimental process.

The VMS is suited for any lab transferring rare and expensive samples and reagents, including compound management and crop science laboratories, where the known volume present in a plate is a critical piece of information. In these settings, samples may be taken in and out of storage multiple times. Using DNA extraction as an example, measuring the volume of starting materials helps determine the correct amount of reagent necessary to perform the extraction.

Gathering volume information from the individual wells of microplates in an established workflow can now be quickly and effectively completed using this system. This information can be utilized for quality control of dispensed plates or verification of pipetting steps in multistage reactions, helping laboratories maintain productivity and data integrity.

For more information, visit http://www.artel-usa.com/products-and-services/vms-volume-measurement-system/



▲ *The Artel VMS measures liquid or solid volumes in microplate wells.*

The Mission of NAOSMM is to promote the professional development of members that support and manage scientific laboratories in educational, research and community settings.

42nd Annual

NAOSMM

Conference Trade Show

EST. 1936

THE QUEEN MARY®

Let's Rock the Boat!

Long Beach, CA July 26 – 31, 2015

JOIN US AT OUR 42ND ANNUAL CONFERENCE AND TRADE SHOW

THE QUEEN MARY LONG BEACH, CA

July 26th – 31st, 2015

YOU CAN'T AFFORD NOT TO ATTEND THIS YEAR'S CONFERENCE:

Over two full days of education and professional development to help you save time, money and help you enhance your career

Two half days exclusively for trade show and vendor interaction.

Network with peers in academia, research and industry.

Training opportunities by the Laboratory Safety Institute and much more…

FOR MORE INFORMATION, PLEASE VISIT US AT WWW.NAOSMM.ORG

WHO ARE WE?

The National Association of Scientific Materials Managers (NAOSMM) is a professional organization of approximately 500 individuals in the USA and beyond involved in purchasing, inventory management and control, and the safety and regulatory matters of laboratory chemicals, supplies, instrumentation and special services in academia, research and industry. With nearly 200 million dollars in buying power, members receive excellent discounts from many vendors. Join with us to help you run an efficient stockroom, provide great customer service, understand federal and local regulations and share best practices in running your laboratory and stockrooms.

NAOSMM

National Association of Scientific Materials Managers

JOIN NOW TO TAKE ADVANTAGE OF:

- Networking with other members in the same field
- Exclusive promotions and savings from supporting Corporate Members
- Advance your career with education and certification programs
- Interaction with scientific supply companies at annual trade show
- Recognition of member volunteers
- Quarterly magazine "Newsline" with insightful articles and information
- NAOSMM Listserv and Forum enables members to interact 24/7
- Online membership directory makes contacting members easy

CORPORATE MEMBERSHIP AND SPONSORSHIP OPPORTUNITIES ARE AVAILABLE.

TO BECOME A MEMBER, GO TO WWW.NAOSMM.ORG

TECHNOLOGYNEWS

ANALYTICAL

Thermal Desorption Autosampler

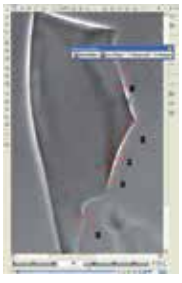
CDS-7500

- Features the ability to change between thermal desorption tubes for air analysis and VOA vials for soil and/or water analysis
- Also able to connect to different front end concentrators such as the CDS-7000 purge and trap concentrator, Dynatherm 9300, and even PT systems from OI and Tekmar
- Compatible with different manufacturers' sorbent tubes

CDS Analytical www.cdsanalytical.com

Glass Trace Analysis Solution

rIQ™



- Combines sophisticated image analysis software, advanced optical design, and standard reference materials
- Enables criminalists in modern forensic laboratories to measure the refractive index of multiple glass fragments simultaneously, quickly, and with the highest accuracy
- When combined with CRAIC microscope spectrophotometers and microcolorimeters, the transmission and fluorescence spectral characteristics of glass evidence can also be determined quickly and accurately with the same instrument

CRAIC www.microspectra.com

Dumas Nitrogen Analysis Instrument

Dumatec™ 8000

- Provides reliable Dumas analysis results at a low cost per sample and in just three minutes
- Design avoids calibration standardization between batches of the same sample type, giving a fast start up time of 30 minutes
- Features a three-stage water removal system that ensures a long lifetime of the water trap-packing
- Versatile for all sample types

FOSS www.foss.dk

Molecular Beam Mass Spectrometers

Veraspec

- High performance gas sampling systems designed for the analysis of high pressure reaction processes up to atmospheric pressure
- Suited to the study of gas kinetics of atmospheric reactions, clusters and high pressure plasmas
- Feature the MAX quadrupole mass filter, a 19mm rod diameter triple filter quadrupole
- MAX quadrupoles are available in mass range options up to 16,000 amu

Henniker Scientific www.henniker-scientific.com

Hydrophobic Interaction Columns

MAbPac HIC-20 and MAbPac HIC-Butyl

- Provide laboratories characterizing monoclonal antibodies (mAb) with additional hydrophobic interaction chromatography (HIC) selectivity options
- Proprietary chemistry used in the new columns is designed to provide new selectivity in high-resolution separations with excellent biocompatibility and high recovery
- Designed for compatibility with organic solvent and aqueous mobile phase, as well as for rugged stability and very low carry-over

Thermo Fisher Scientific www.thermoscientific.com

GPC/SEC Platform

OMNISEC

- Integrates highly efficient sample separation via the OMNISEC RESOLVE module and high sensitivity analysis using OMNISEC REVEAL, a fully integrated multi-detector array
- Designed for researchers and formulators developing novel natural and synthetic polymers, pharmaceutical, and biopharmaceutical products and foods
- OMNISEC REVEAL can be purchased as an individual detector module to add to an existing GPC/SEC system

Malvern Instruments www.malvern.com

Miniature Spectrometer

Flame

- Delivers high thermal stability and low unit to unit variation without compromising the flexibility and configurability that are the hallmark of modular, miniature spectrometers
- Features interchangeable slits, indicator LEDs and simpler device connectors
- Provides great flexibility for a wide range of UV-Vis applications in chemistry, physics, biology, materials science, earth science, and chemical engineering

Ocean Optics www.oceanoptics.com

UV-Vis Spectrophotometer

UV-1280

- Offers wavelength scanning from 190 to 1,100 nm
- Suited for applications in a variety of industries, including environmental, food quality, and life science
- Enables intuitive operation, while the enhanced validation, maintenance, and inspection functions improve work efficiency
- Monitored system for the D2/WI lamps ensures that users can perform highly stable measurements with this compact unit

Shimadzu www.ssi.shimadzu.com

PTR-TOFMS System

PTR-QiTOF

- Features a quadrupole ion guide (Qi)
- Delivers up to 25x more sensitivity, one order of magnitude lower detection limit, and 20% higher mass resolution
- Boost in sensitivity is especially beneficial for cutting-edge applications like eddy-covariance flux measurements, where ultra-low VOC concentrations have to be quantified with more than 10 Hz

IONICON www.ionicon.com

BASIC LAB

Hotplate Stirrers

- Incorporate two independent control circuits; the additional and independent safety circuit is for limiting the maximum heating plate temperature
- Extra circuit can be adjusted between 50 and 360ºC but cannot be changed accidentally
- Ensures that the flashpoint of the user's reaction solvent is not exceeded, making it ideal for teaching laboratories
- Features a hermetically sealed design

Asynt www.asynt.com

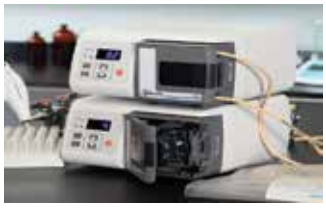
Non-Ducted Fume Cupboards

- Available in standard widths from 550mm to 900mm wide
- Fully compliant with COSHH regulations and international standards including BS7989:2001 for filtration fume / particulate cupboards
- Employ extra-large capacity activated carbon filters for removal of fumes and/or HEPA filters for particulate removal
- Include a 5-year warranty and may be supplied with an optional dual filtration capability

Asynt www.asynt.com

Peristaltic Pumps

Masterflex Catalyst™



- Integrated pump and drive systems arrive fully assembled and ready to run
- Takes only 30 seconds to change tubing and tubing occlusion is automatic when the pump head is closed
- Interlock switch powers unit down when pump head is opened while the unit is running
- Accept multiple tubing sizes for a broad flow range

Cole-Parmer www.coleparmer.com

Chemical-Resistant Lab Furniture

- Built from Trespa Toplab Base—a brand of high pressure laminate plate—giving an attractive appearance and a range of inherent benefits
- Chemical-resistant, antistatic, has low dirt pick-up, is easy to clean, and is scratch-resistant
- Can be created bespoke to requirements and a core range of sub-assemblies will be kept in stock for a short delivery time

Connect 2 Cleanrooms www.connect2cleanrooms.com

Small Volume Dissolution Tool

Mini HeightChek™

- This fixed 10mm gauge accurately sets the paddle or basket heights prior to using the Distek small volume dissolution accessory
- Addresses the increase in utilization of small volume (<200 ml) dissolution testing in the marketplace
- Provides users with a quick and simple tool for setting the operating heights

Distek www.distekinc.com

Educational Microfluidic Starter Kit

- This low-cost kit is aimed at educational initiatives or those new to microfluidics
- Offers connect-and-go microfluidic capabilities, allowing easy set-up without the need for specialist tools or a gas supply
- Enables users to create small droplets, mix fluids, or observe microchannel flow, allowing them to investigate or demonstrate a wide range of microfluidic applications

Dolomite www.dolomite-microfluids.co.uk

Direct Concentration Technology

SampleGenie 4

- Enables large sample volumes to be dried directly into vials, eliminating a number of time-consuming sample handling steps and the attendant risk of errors
- Designed for use in the Rocket Synergy evaporator
- Accommodates sample volumes of up to 250ml, and features a new vial adapter insert to suit a range of vials from 12mm to 28mm diameter and up to 70mm tall

Genevac www.genevac.com

pH, DO, and EC/TDS/Salinity Meters

edge® Series

- Thin and lightweight, measuring only half an inch thick and weighing just 9 ounces, blending elements of a portable and benchtop meter into a seamless design
- Can be used like a benchtop or portable meter, which can even attach to a wall to free up valuable bench space in a laboratory
- Includes HI2002 pH/ORP, HI2003 EC/TDS/Salinity, and HI2004 DO

Hanna Instruments www.hannainst.com

Digital Refractometer

HI96800

- Measures Refractive Index and displays both temperature compensated (nD20) and non-temperature compensated (nD) readings along with temperature on a dual-level LCD screen
- Can also convert Refractive Index to % Brix scale with the push of a button
- Features a wide range of 1.3300-1.5080 Refractive Index with +/- 0.0005 accuracy

Hanna Instruments www.hannaisnt.com

Laboratory Fume Hood

UniFlow CE

- This full duty fume hood in a compact size offers 50% energy savings over conventional hoods
- Low-flow constant volume by-pass design maintains consistent face velocity
- Offered in 30", 36", 48", and 72" widths and can be equipped with a wide selection of accessories to meet user's specific process needs
- Constructed totally of composite resin

Hemco www.hemcocorp.com

Onsite Laboratory Gas Generators

AiroGen®

- Offer a safe, easy to use, economical and efficient technology for high purity H_2, N_2, and ZERO AIR analytical grade laboratory gases on demand
- AiroGen range includes hydrogen generators, nitrogen generators, zero air generators, air & gas systems, compressed air supply systems and compressed air treatment
- Comprehensive service available

IATT www.iattlabgas.co.uk

Volumetric Karl Fischer Titrator

AQUACOUNTER® AQV-2200S

- Suited for working in a very wide moisture range from 100 ppm to 100% water content with its maximum capability for automation and future upgrade options
- A large color touchscreen guides the user from setup to a complete analysis
- Comes with a built-in thermal printer, has enhanced memory capacity, and more

JM Science www.jmscience.com

Sonic Reservoir Sensor System

- Measures the levels of solvents used in unattended liquid chromatographic separations in real time
- Useful during a weekend or lengthy chromatographic analysis when there is the risk of running out of solvents during unattended operation
- Employs a sound wave transmitter positioned in the reservoir's cap to accurately measure the level of the solvent in the 1 liter reservoir

JM Science www.jmscience.com

Vacuum Concentrator

CentriVap® micro IR

- Fits in tight spaces and is suited for small throughput in molecular biology, proteomics, genomic, genetics, cell biology, and drug discovery labs
- Weighs only 20 pounds, meaning it may be easily transported from lab to lab
- Transparent infrared (IR) glass lid directs heat over the samples to speed evaporation and reduce cross contamination from condensation

Labconco www.labconco.com

Filtered Balance Systems

RXPert™

- Are Class I biological safety cabinets, meeting requirements for non-sterile powders and particulates contained during hazardous drug manipulation
- These true bag-in/bag-out HEPA-filtered powder hoods include a canopy and damper for thimble ducting the enclosure to the outside
- Feature a deep interior of 23.4" as well as an ergonomic air foil with Clean-Sweep™ airflow openings

Labconco www.labconco.com

Viscometer

microVISC-m™

- Designed to simplify daily or routine measurements of lubricating oils' viscosity
- Suited for oil-condition monitoring and is portable, easy to use, fast, and requires only a few drops of oil
- Measures oil viscosity through an easy, one-minute test, eliminating the need to wait for test results from remote labs
- Displays dynamic viscosity at ambient conditions

RheoSense www.rheosense.com

Pipette Tip Racks

Rainin TerraRack

- Help minimize the problem of plastic tip rack waste
- Are 50 percent lighter than conventional tip racks, highly compressible when empty, and completely recyclable
- Composed largely of polyethylene terephthalate, an exceptionally strong polyester that's easy to recycle and in high demand as a post-waste commodity
- After use, racks nest inside one another, reducing their volume and disposal costs

METTLER TOLEDO www.mt.com/rainin

Thermoelectric Peltier Chiller

TCL-10

- Simple to operate and can keep user's sample at a low temperature for long periods
- Cooling causes no mess or contamination
- 20 sample compartments are in each block, sizes 0.2 ml to 2 ml, and the compartments can easily be changed when different sizes are needed
- Two different models are available

OMEGA www.omega.com

Light Duty Motorized Table

LMT

- This ergonomic, multi-purpose worktable can be equipped for many environments
- Suited for light industrial, laboratory, light assembly, quality control, packaging, and technical offices
- Designed to meet ergonomics standards for users in both seated and standing positions
- Table frame is quickly adjustable by using an integrated linear actuator system, providing height adjustment from 25.39" to 45.08"

Sovella USA www.sovella.us

High Pressure Reactor

HPR-Micro Reactor™

- Designed for small batch reaction chemistry and is especially suited to early, exploratory research
- Comes standard with a 10 milliliter Iconel 718 reactor vessel for operation up to 10,000 psi (689 Bar / 68.9 MPa), inlet and outlet valves, and a pressure gauge
- Depending upon the temperature option selected, operation from -40°C to 150°C is possible

Supercritical Fluid Technologies www.supercriticalfluids.com

Sampling Pump Calibration Unit

Defender Series

- DryCal® technology provides fast, ±1% of reading calibrations
- Includes three levels of instrumentation, giving the user flexibility to do as much as needed while working to defend lives
- Features a broad dynamic flow range with a choice of single, hands-free continuous, or user -specified "Burst" measurements
- Boasts a field-friendly, rugged, and lightweight design

New Star Environmental www.newstarenvironmental.com

Manual Capper

Univo CM480

- Designed to seal an entire rack of tubes with push caps in a single action
- Able to repeatedly and reliably secure cap tubes (up to 1.40 ml) in all ANSI /SLAS format racks up to a maximum height of 48mm
- Includes an adapter matched to user's specific rack type and tube height to ensure best results

Micronic www.micronic.com

INFORMATICS

Utilization Management Reporting System

Test Utilization Module

- Helps laboratories identify opportunities to eliminate unnecessary testing within a few minutes of deployment
- Provides laboratory directors and managers with business intelligence and analytics to help their management teams monitor key performance indicators
- Graphical reporting provides immediate insight into key aspects of laboratory performance including turnaround time, productivity, quality, financial management, and utilization

Visiun www.visiun.com

Database of Bioactivity Data & Drug Targets

ChEMBL v.20

- Now incorporates the Hierarchical Editing Language for Macromolecules (HELM), the macromolecular representation standard recently released by the Pistoia Alliance
- Can be used to represent simple macromolecules (e.g. oligonucleotides, peptides and antibodies) complex entities (e.g. those with unnatural amino acids) or conjugated species (e.g. antibody-drug conjugates)
- In the future, will enable researchers to query content in new ways

European Bioinformatics Institute www.ebi.ac.uk

LAB AUTOMATION

Volume Measurement System

VMS™

- Measures liquid and solid contents of 96- and 384-well microplates
- Designed to improve in-line process efficiency and quality assurance in compound management and storage
- Can also assess the delivery accuracy and precision of automated liquid handlers
- By sealing and pressurizing individual microplate wells, the unit measures their contents, down to 1 percent of the potential volume

Artel www.artel-usa.com

PRODUCT SPOTLIGHT

MEET THE ROBOT THAT USES CONVENTIONAL PIPETTES

NEW MODELS AND ACCESSORY BRING USERS MORE AUTOMATION OPTIONS

One of the standout products at SLAS2015 last month was Andrew Alliance's Andrew pipetting robot. Originally released at SLAS2013, the company had some new options on display for the system, which uses conventional, non-electronic pipettes. This year, Andrew Alliance launched a Rainin LTS compatible model, a high volume model giving customers a working volume range of up to 10ml, and a pipette performance verification system called Andrew Calibro.

"Our approach was novel in the industry and allows our customers to use the tools they already own and that have been trusted for accuracy and robustness for decades," says Scott Roler, director of sales and marketing at Andrew Alliance USA.

While the system currently works with Gilson Pipetman Classic and now Rainin LTS pipettes, Roler says the company hopes to expand this offering in the future. And, the new Andrew Calibro accessory, "allows the unattended verification of manual pipette performance using photometric methods." The Calibro can test a set of five pipettes in roughly two hours with no intervention or action from the user, Roler explains.

He adds that Andrew is easy to set up, connecting to most computers using a USB cable and taking no more than five minutes to get going. "Plug Andrew into a standard 120V outlet, USB connection to a computer, and you are ready to automate your protocols whether on a bench, fume hood, or in a cold room," Roler says.

The system requires little to no maintenance, though Andrew Alliance suggests following the recommended guidelines for the actual manual pipette calibration to assure accuracy of the system as a whole.

For more information, visit www.andrewalliance.com

Heat Sealer for 96-well Tubes

CSP8

- Permits the sealing of eight REMP tubes at a time, avoiding the need to seal an entire 96-tube rack
- Produces tightly-welded, pierceable seals
- REMP tubes' small volumes allow for multiple aliquots of individual samples—avoiding freeze-thaw cycles
- Permits fast vein-to-freezer times in applications with distributed biosample collection and subsequent storage in central biobanks

Brooks Automation www.brooks.com

LIFE SCIENCE

Human Inflammation Panels

Bio-Plex Pro™

- These multiplex immunoassays enable detection and quantification of a comprehensive set of key inflammation biomarkers in a single assay
- Available as premixed and ready-to-use large screening kits (37-plex or 24-plex), a pathway-focused Treg 12-plex kit, singleplex assays, or any custom kits
- Require only a single sample dilution factor and single-level control, simplifying setup

Bio-Rad www.bio-rad.com

Screening Multiplex Kit for Cancer Research

ddPCR™ KRAS

- Offers improved sensitivity and simultaneous detection of the seven most common KRAS mutations in a single ddPCR experiment
- Used with Bio-Rad's ddPCR technology, able to detect and quantify extremely low levels (down to 0.2%) of KRAS mutant DNA in a single assay
- Allows researchers to derive results from low amounts of starting material

Bio-Rad www.bio-rad.com

Bench-Scale Bioprocess Control Station

BioFlo® 320

- New features include autoclavable and single-use vessel flexibility, intelligent sensors, and IP network communication for multi-unit control
- Suitable for microbial and cell culture, scale up to scale down, batch, fed-batch, and continuous processes
- Offers flexibility, better control, and maximum functionality while occupying a fraction of the valuable lab space of similar systems

Eppendorf www.eppendorfna.com

Platform for Nucleic Acid Purification

MPure-12™

- Automated platform is designed for the magnetic bead-based purification of nucleic acids from a wide range of biological samples
- Features a uniquely-designed magnetic bead-based processing chamber
- Fully integrated with easy to use, sample specific, pre-packaged reagent kits to process a wide range of bio-specimens
- Offers excellent yield, purity, reliable performance, flexibility, and convenience

MP Biomedicals www.mpbio.com

qPCR System

Prime Pro 48

- Offers greater accuracy and higher quality data for a variety of applications, setting novel standards of performance, simplicity, and versatility
- Has 400 associated qPCR detection kits, which cover a wide range of application areas including clinical, veterinary, food, and biohazard testing
- Uses an economical 48-well PCR plate, which is simple and fast to set up

Techne www.techne.com

PRODUCT SPOTLIGHT

IT'S ALL UNDER CONTROL

INTELLIGENT SOFTWARE MAKES ASSAYS EASY IN NEW MICROPLATE READER

At SLAS2015, the 4th Annual Conference and Exhibition of the Society for Laboratory Automation and Screening, attendees got to check out a particularly versatile multimode microplate reader.

Thermo Fisher Scientific's Varioskan LUX reader features the company's new SkanIt Software that is designed to simplify data acquisition and analysis and accelerate consistency and reliability in assay results. It's geared towards bioscience researchers performing a variety of microplate assays, offering automated functionality.

"The Varioskan LUX with SkanIt software builds upon our long history in pioneering microplate reader technology innovations," said Hanna Grano-Fabritius, business director of sample preparation and analysis at Thermo Scientific. "With advancements including integrated smart control technology and automatic dynamic range selection, the Varioskan LUX is designed to simplify set-up while optimizing performance to deliver exceptional usability and data reliability."

Smart safety controls on the system include automated plate check, built-in shaker speed control, and automatic prime check and position sensors for the built-in dispensers, which are designed to identify and notify the user of potential errors that could compromise research. In addition, the SkanIt software monitors and captures measurement data throughout the run to reduce the risk of wasting expensive reagents, samples, and time.

Among a variety of other benefits, the Varioskan LUX also offers an automatic dynamic range selection feature that eases protocol set-up by eliminating the need for users to manually adjust sensitivity settings for each assay. The instrument automatically selects the optimal reading range based on signal intensity in the well, using settings to obtain maximum sensitivity and ensuring consistency of results.

For more information, visit www.thermoscientific.com/varioskanlux

Molecular Barcoding & Analysis Platform

GemCode™ Platform

- Consists of instrumentation, reagents, and software, which delivers long range information, including haplotype phasing, structural variation, and de novo assembly
- By upgrading existing short read sequencers the GemCode Platform generates a powerful new data type: linked reads
- Partitions arbitrarily long DNA molecules (including >100 kb) and prepares sequencing libraries in parallel

10X Genomics www.10XGenomics.com

Bioreactor Systems

Ambr® 15 and Ambr® 250

- 2015 versions will be supplied with integrated BioPAT® MODDE Software for Design of Experiments (DoE), powered by Umetrics
- Software allows bioprocess scientists to easily implement DoE into their workflow for simpler process optimization and scale-up to larger single-use BIOSTAT® pilot and manufacturing scale bioreactors
- Enables scientists to quickly establish a design space where relevant bioprocessing conditions are varied simultaneously

Sartorius Stedim www.sartorius.com

SUPPLIES & CONSUMABLES

Cap & Tube Label Sets

CILS-8/9000

- Multiple CILS label shapes and sizes now available on a single roll/A4 sheet, allowing variable data printing (batch numbers, barcodes etc.) 'in-lab, on demand' straight from user's standard laser or thermal transfer printer
- Available color-coded for immediate sample recognition
- Label range provides immediate high-strength bonding to all labware during cryogenic freezer storage (-196°C) and multi-freeze thaw cycles

CILS International www.cils-international.com/usa

DNase / RNase- & Pyrogen-Free PCR Plates

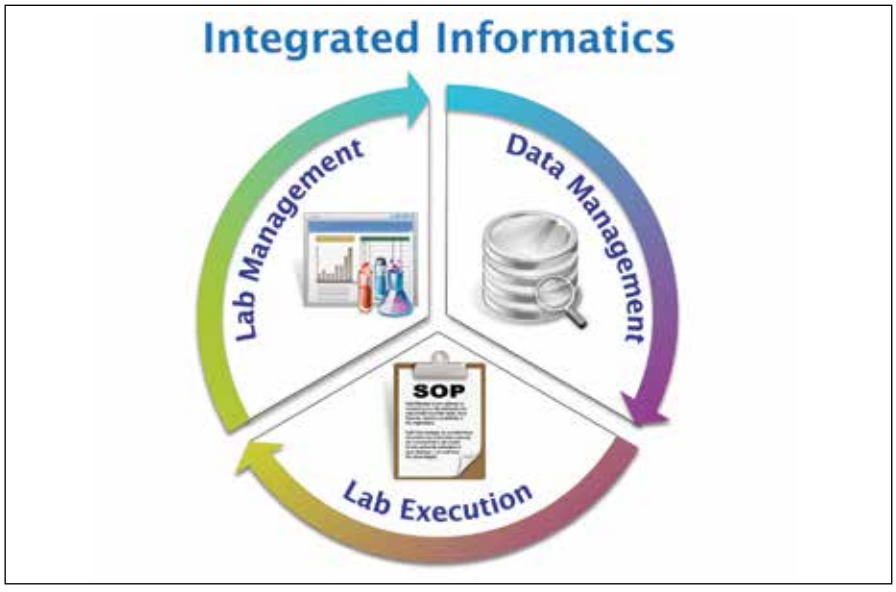
- Feature high rigidity to minimize distortion before and after thermal cycling
- Produced in Class 10,000 cleanroom conditions
- Certified free of pyrogens as well as DNAse and RNAse enzyme activity, enabling routine achievement of excellent PCR results
- Based upon a well design that eliminates sample carryover problems when using a plate lid

Porvair Sciences www.porvair-sciences.com

Informatics Infrastructure in the QA/QC Lab

By Trish Meek, Director of Product Strategy, Thermo Fisher Scientific

The goal of achieving a truly paperless lab has been discussed for the past 20 years, but it is now, with technology catching up to the discussion, finally materializing. Nowhere is this more evident than in pharmaceutical Quality Assurance/Quality Control (QA/QC) laboratories. Few QA/QC lab techs still record their data by hand, but this is only the first step – labs must adopt a smart infrastructure that drives quality throughout the organization. In many cases, an integrated informatics solution is the engine that drives this culture of continuous process improvement.



Laboratories across every industry are looking for more integration in their labs and more connectivity with the rest of their organization. SampleManager is a fully integrated laboratory platform comprising Laboratory Information Management (LIMS), Scientific Data Management (SDMS) and Lab Execution (LES).

FDA & Quality by Design

In 2004, the FDA introduced Quality by Design (QbD) in "Pharmaceutical cGMPs for the 21st Century - A Risk-Based Approach." This was the first attempt to apply these principles to the pharmaceutical industry. Quality by Design is built on the concept that well-understood products and processes are more efficient and produce higher quality products. The FDA's goal was to improve pharmaceutical companies' productivity, ensure patient safety and prevent drug shortages. Informatics plays a critical role in ensuring that organizations realize the improved product quality and operational efficiency that adherence to QbD principles provides.

The Informatics Solution

To meet QbD requirements, QA/QC laboratories need a tightly controlled process that drives predictive analytics and prevents substandard products. An end-to-end informatics solution warns the organization before nonconformances occur by monitoring critical product attributes in near real-time. Laboratories address these needs through the use of several systems: Lab Execution Systems (LES), Scientific Data Management Systems (SMDS), and Laboratory Information Management Systems (LIMS).

LES has become a critical component of today's paperless lab, ensuring that quality processes built on QbD principles are followed in day to day operations. The system can guide users through any laboratory procedure, providing technicians with the direction they need to execute processes consistently. It also assures laboratory management that good laboratory practices and standard SOPs are being followed.

An SDMS lets managers integrate instruments across the lab and centralize data capture, allowing for long-term data archiving and data visualization. An SDMS saves both original raw data files from the instrument and normalized representations in XML, allowing it to interpret data from multiple instruments using different

software or file formats. The final product specification is defined by comparing the analytical results to determine which formulation and process parameters yield the best product. An SDMS integrated with the LIMS reduces paperwork and manual review time, which in turn improves efficiency, productivity, consistency and quality. SDMS also provides access to archived files for as long as necessary, enabling more efficient and defensible regulatory reporting.

A LIMS remains a critical part of any pharmaceutical organization's infrastructure. Today's LIMS go far beyond the management of samples, tests, and results; they also provide resource management, allowing organizations to forecast sample volume and resource needs. Many also offer dashboard views that allow organizations to identify any data that is approaching warning or failure limits. These lab management activities are essential.

Having a smart infrastructure built on a state-of-the-art informatics solution enables another critical benefit in the lab: automation. Even smart instruments must undergo regular performance verification, and because instrument failure or miscalibration can negatively impact quality down the road, any risk is unacceptable. A LIMS can save considerable time by helping labs automate critical maintenance procedures. When all systems are aligned, the convergence of people, processes and technology is transformative.

Integrated informatics enable labs to execute and manage all lab processes easily, with the data rigor and intelligence that lab managers require to drive efficiency and profitability – for the lab and for the business.

Going Beyond Paperless

Today's paperless lab can also be called an "integrated" lab. The ability to manage all lab processes in a tightly integrated solution dramatically streamlines laboratory operations while minimizing cost of ownership. An example of this is SampleManager LIMS, which includes built-in functionality for LIMS, LES and SDMS. With LES functionality available as part of a LIMS implementation, SOPs and methods are automatically established electronically so that all lab personnel can use the LIMS as their guide.

It's easy to see this focus on informatics as a lab-centric view of the pharmaceutical business, but that would be a mistake: the ability to run efficient labs and protect brands by ensuring quality are both enterprise-level concerns. As such, the LIMS needs to be fully integrated with ERP systems. In fact, many requests coming into QA/QC laboratories are actually initiated in a manufacturers' ERP system, which often serves as the bridge between a manufacturing execution system (MES) and other systems.

Conclusion

In many organizations, a LIMS is a standalone investment: if the lab needs additional software, such as an ELN or SDMS, those systems are then purchased, implemented and supported separately. By instead having all these capabilities resident in a single system, labs can reduce cost of ownership, increase ease of training, streamline compliance and achieve better overall quality control. All of this is possible across vast geographies and contractual partnerships.

Organizations that haven't done so already need to make this year a major inflection point for laboratory technology, especially for QA/QC. The case is clear that the costs of inaction outweigh the investment required for change.

Trish Meek is Director of Product Strategy for the Informatics business at Thermo Fisher Scientific.

To learn more about Integrated Laboratory Informatics, visit www.thermoscientific.com/SM11 or email us at marketing.informatics@thermofisher.com.

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Serving Large Labs with a Complete Hydrogen Solution

Many lab managers understand the value of switching from delivered gas to an on-site hydrogen gas supply. On-site generation offers a pure, constant and safe supply of hydrogen gas as opposed to delivered cylinders. But, for large laboratories that cover multiple rooms and floors, switching to hydrogen gas generators is a tough decision. A large lab may have tens or hundreds of Gas Chromatography (GC) systems which would need many small generators to meet the full demand of FID and/or Carrier Gas requirements, and that is often not economically viable. Lab managers in large facilities can avoid having to invest in numerous gas generators by installing a single, larger Proton OnSite hydrogen generator and plumbing it into each lab as a 'lab server'. That way they can receive a stream of gas at the flick of a switch, anywhere in the building.

A Unique Proposition

Proton OnSite's large PEM electrolyzers are the only generators in the laboratory market with the ability to run as a Lab Server. One S-Series hydrogen generator can supply up to 200 GC units with ultra high-purity hydrogen gas that can be maintained and managed from a single source. Proton OnSite's technology can also ensure that pressure, flow and purity are constant throughout the building, and can be monitored at all times.

Safety First

Ensuring safety is paramount for a facility that deals with thousands of liters of hydrogen gas each day, considering a single hydrogen cylinder storing 6,300 liters of gas has the explosive potential of 35 lbs of TNT. A facility with hundreds of GC systems fed by cylinders of hydrogen has a tremendous explosive potential, so a lab manager that opts for delivered cylinders has to invest in significant safety infrastructure to mitigate those risks. By replacing those cylinders with a single centralized Proton OnSite hydrogen gas generator that only produces gas when necessary and has a limited capacity, labs can dramatically reduce both the explosive potential and the amount of time and money spent handling heavy, dangerous cylinders.

Making the Helium Switch Make Sense

Most laboratories are facing a future with a less reliable and more expensive helium gas supply, causing them to explore their carrier gas options. Large labs that wish switch to on-site hydrogen gas will have to invest in many small hydrogen generators for each lab, creating upfront costs that can be tough to justify. But, hydrogen is quickly becoming less expensive than helium and is a more efficient carrier gas. The lab server solution allows large labs to justify the switch while providing their practitioners with a carrier gas that offers superior, cost-effective results.

A Proton OnSite hydrogen gas lab server can be installed into a large facility in hours and are easier to maintain than several generators or rooms filled with heavy, dangerous cylinders. The lab server is the only option for large laboratories that need pure and constant hydrogen gas in every room and on every floor.

Proton OnSite S-Series Hydrogen Generator

The Proton OnSite S-Series hydrogen generation systems produce up to 18.8 slpm of ultra-high purity hydrogen gas for multiple use with multiple GC systems. A single S-Series hydrogen generator, when installed into a large lab's gas systems, will be able to serve numerous floors and rooms with a constant, pure stream of hydrogen gas at the flick of a switch.

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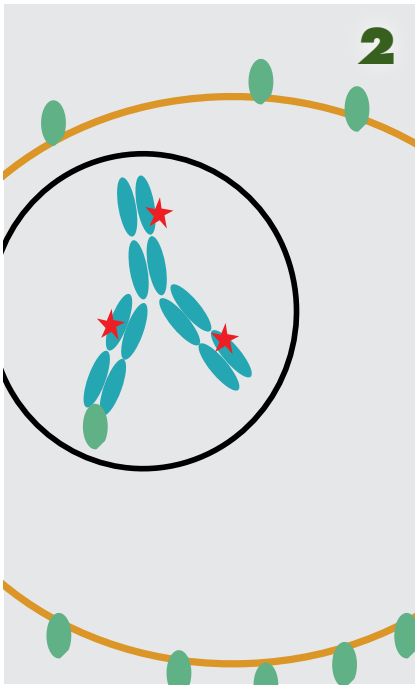

LAB MANAGER ONLINE

We look back at our web content since the April issue and look forward to what's in store for the upcoming May issue.

1 Growing Forward

Two cannabis testing labs from Colorado share their thoughts on how the state's emerging recreational marijuana industry has affected them, discussing the challenges they face, the key technologies they use, how they motivate their staff, and the excitement of being at the forefront of an emerging industry.

Read more at **LabManager.com/growing-forward**

2 Trending on Social Media: Developing Antibody-Drug Conjugates

As of March 17, *Lab Manager*'s top March issue article posted to Facebook was our Life Science INSIGHTS on Developing Antibody-Drug Conjugates (ADCs). As of St. Patrick's Day, this article, which deals with the move towards personalized cancer treatments and the role ADCs are playing, had received 39 likes, one comment, and 13 shares on Facebook.

Read more at **LabManager.com/ADCs**

3 Most Popular Webinar

Last month's top webinar on LabManager.com was "Safety in the Laboratory," presented by Vince McLeod, which provided a comprehensive overview of all potential hazards faced in laboratory settings and covered the major OSHA requirements. This webinar had 927 registrants and though it ran Feb. 17, you can still catch it on-demand at the link below.

Read more at **LabManager.com/safeinlab**

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NEXT ISSUE ➡

Laboratory Apps and Gadgets

The number of laboratory apps has grown significantly over the past few years as researchers have come to accept the technology. Previously focused on applications within the lab, newer apps offer remote access to instruments from outside the lab as well.

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